REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

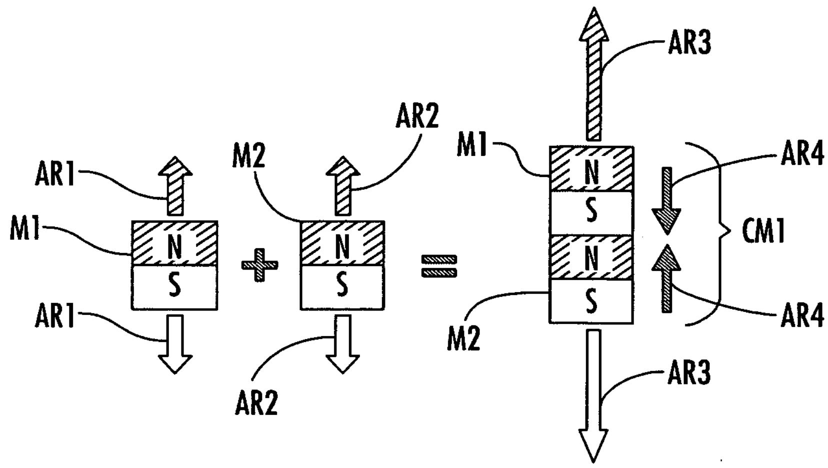


FIG. 1

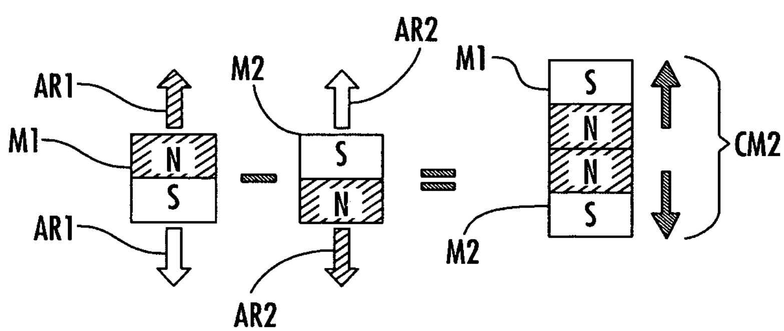


FIG. 2

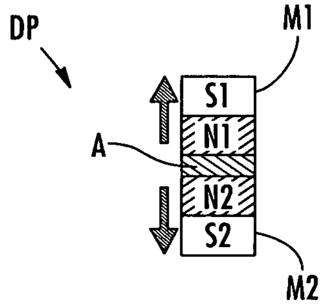


FIG. 3A

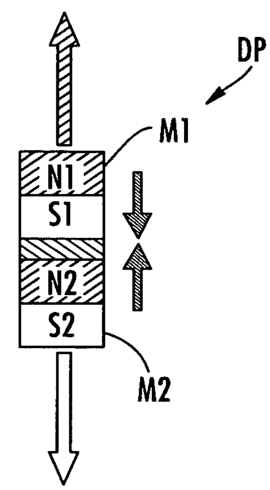


FIG. 3B

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

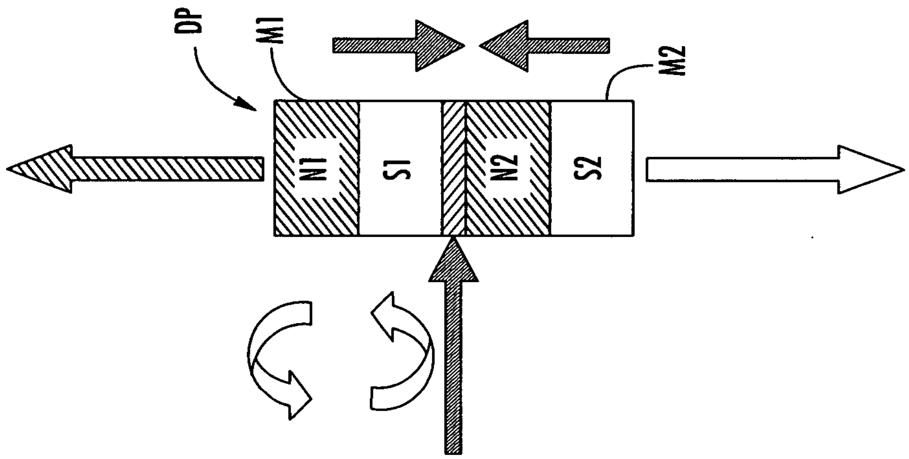


FIG. 3D

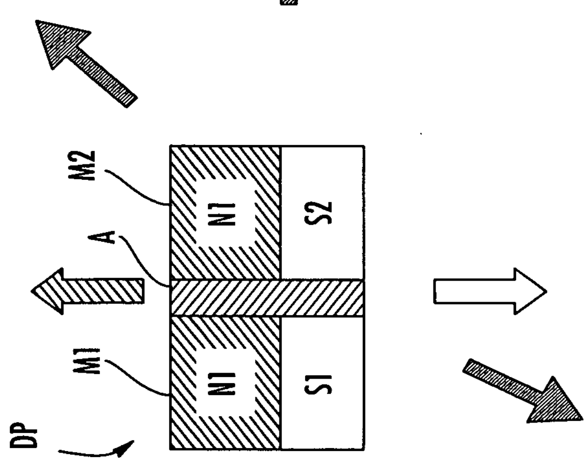


FIG. 3C

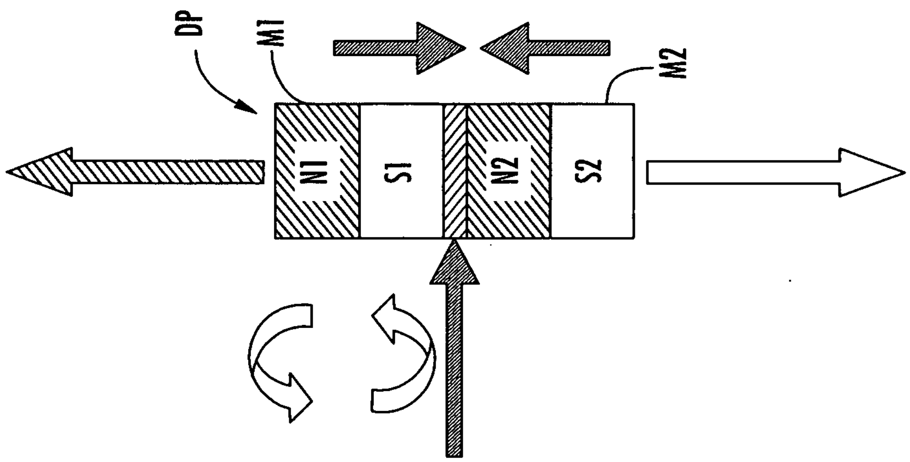


FIG. 3F

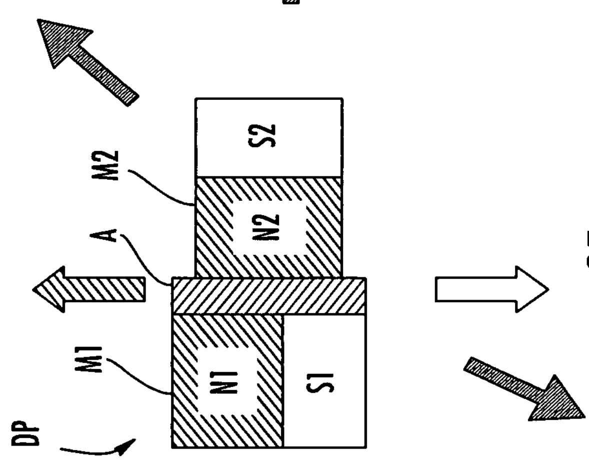


FIG. 3E

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

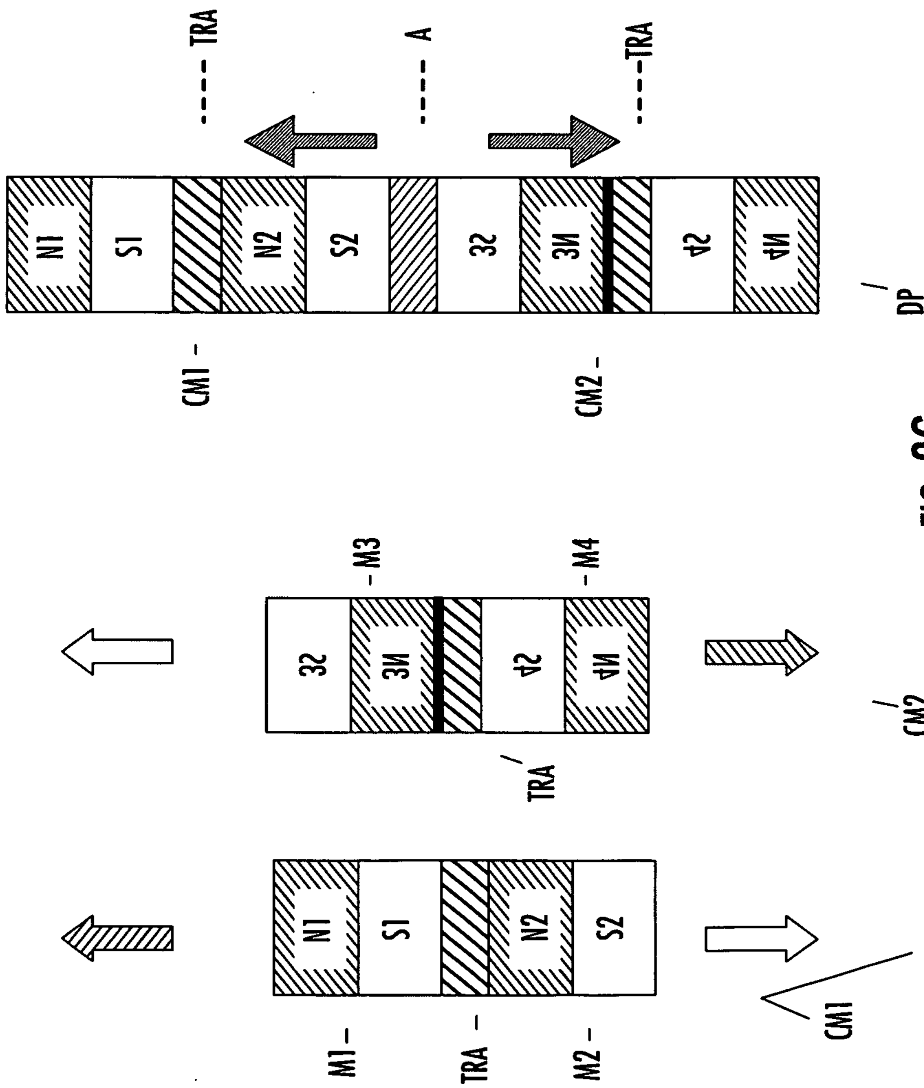


FIG. 3G

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices
for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

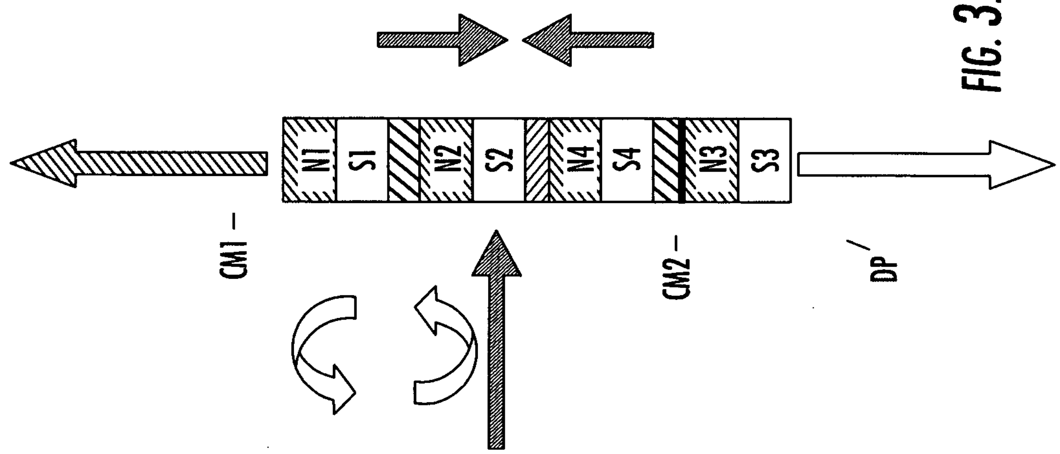


FIG. 3I

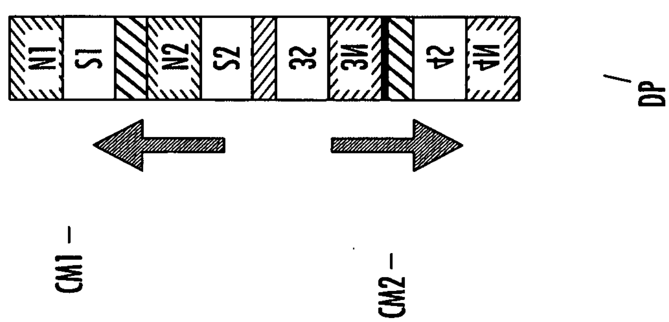


FIG. 3H

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

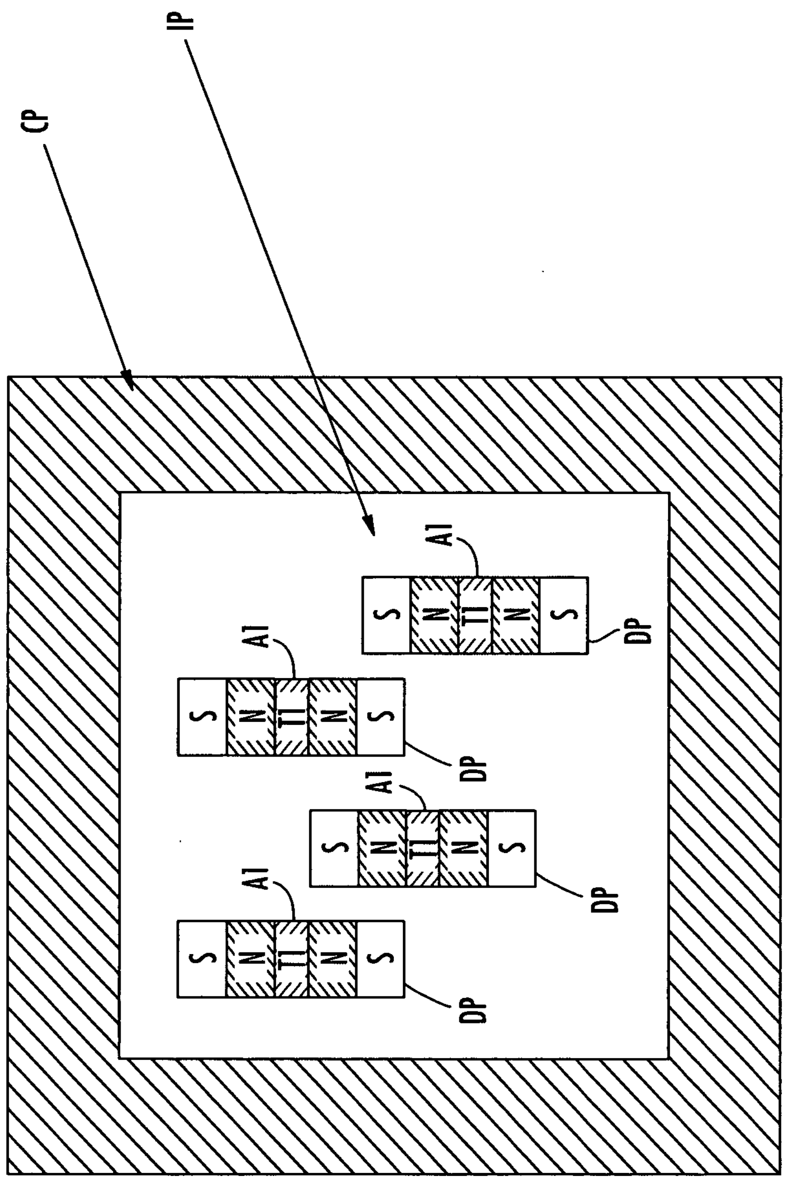


FIG. 3J

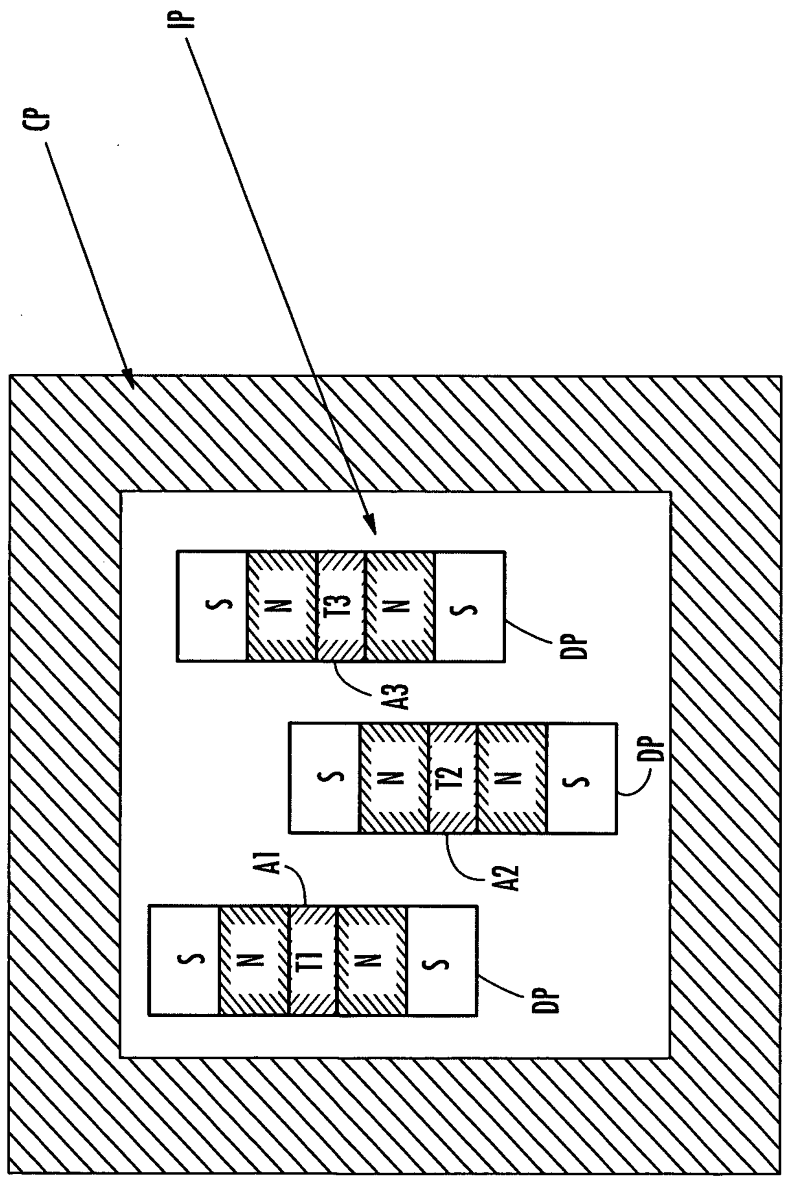


FIG. 3K

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices
for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

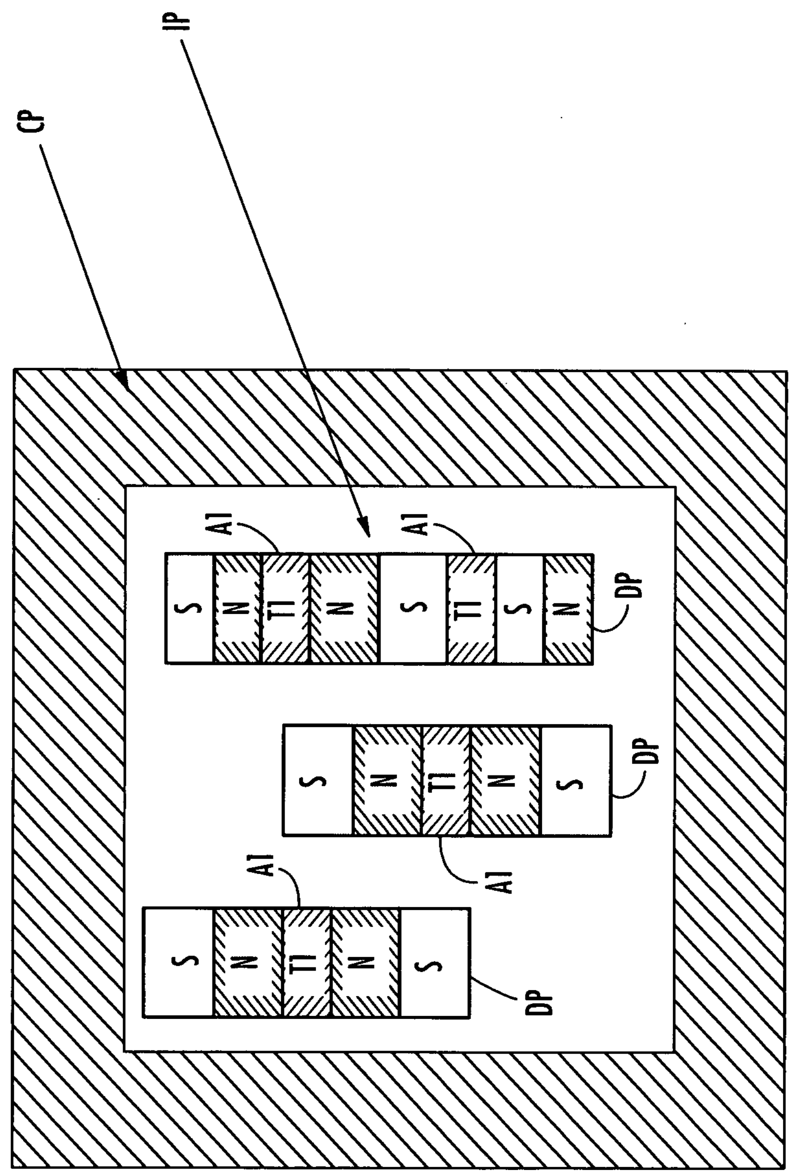


FIG. 3L

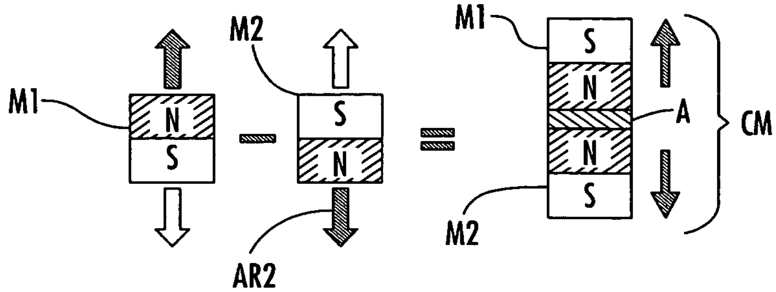


FIG. 4

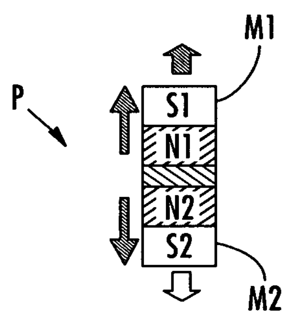


FIG. 5A

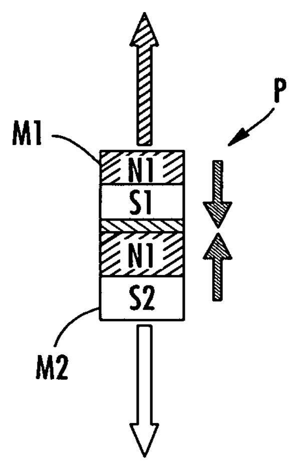


FIG. 5B

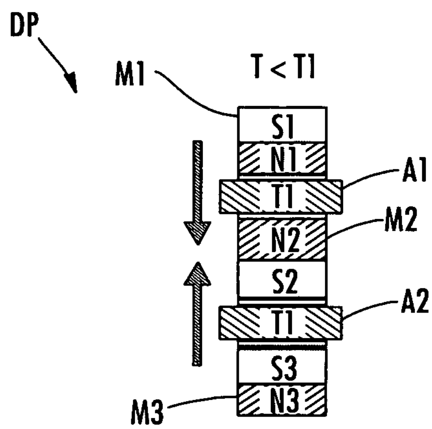

DP
M1
T < T1
S1
N1
T1
A1
N2
M2
S2
T1
A2
S3
N3
M3

FIG. 6A

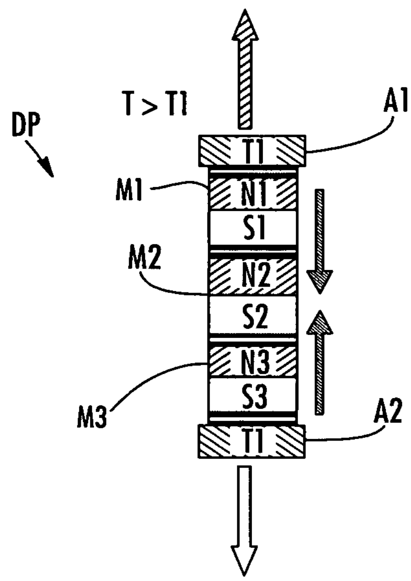

T > T1
A1
DP
T1
M1
N1
S1
M2
N2
S2
N3
M3
S3
A2
T1

FIG. 6B

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices
for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

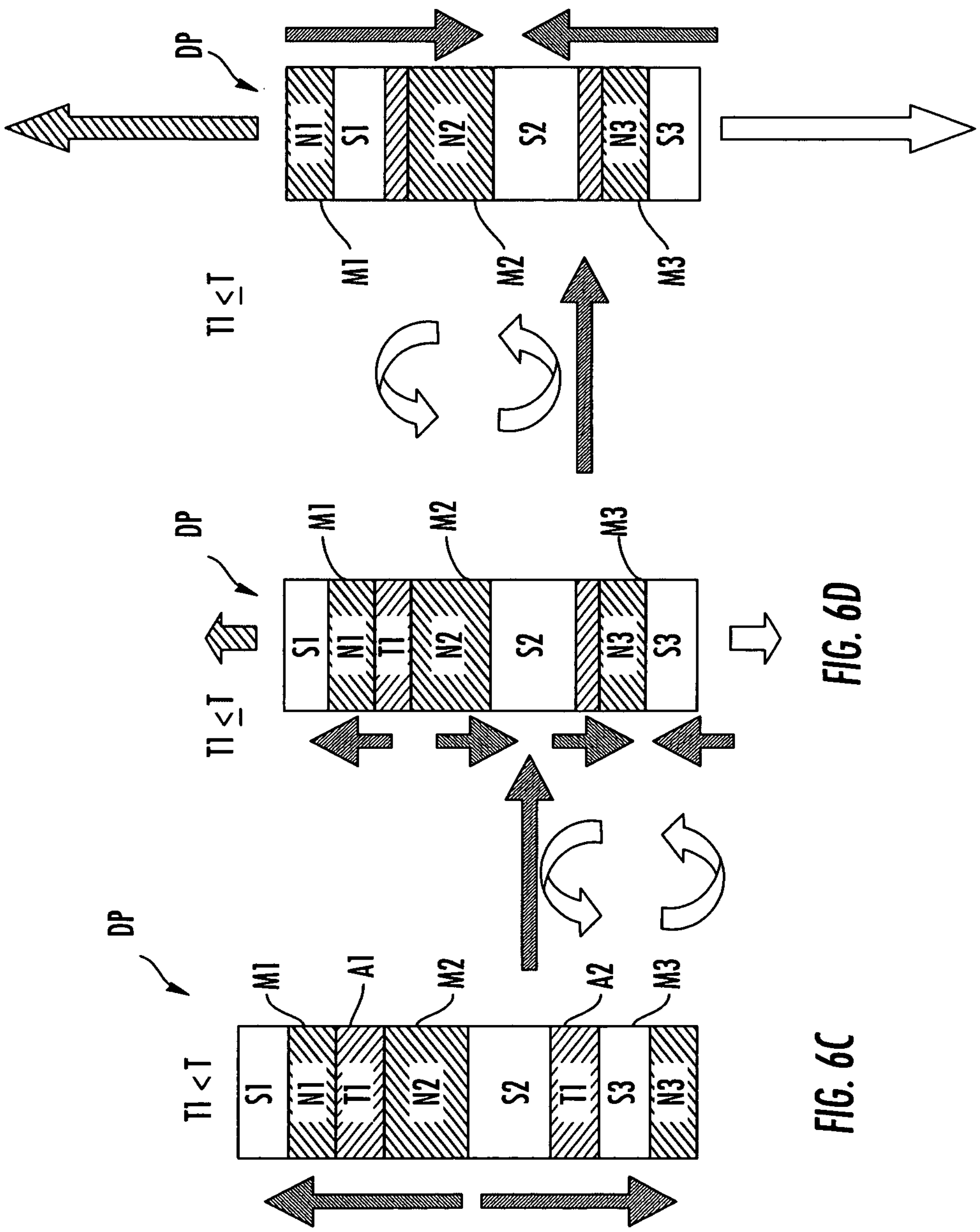


FIG. 6E

FIG. 6D

FIG. 6C

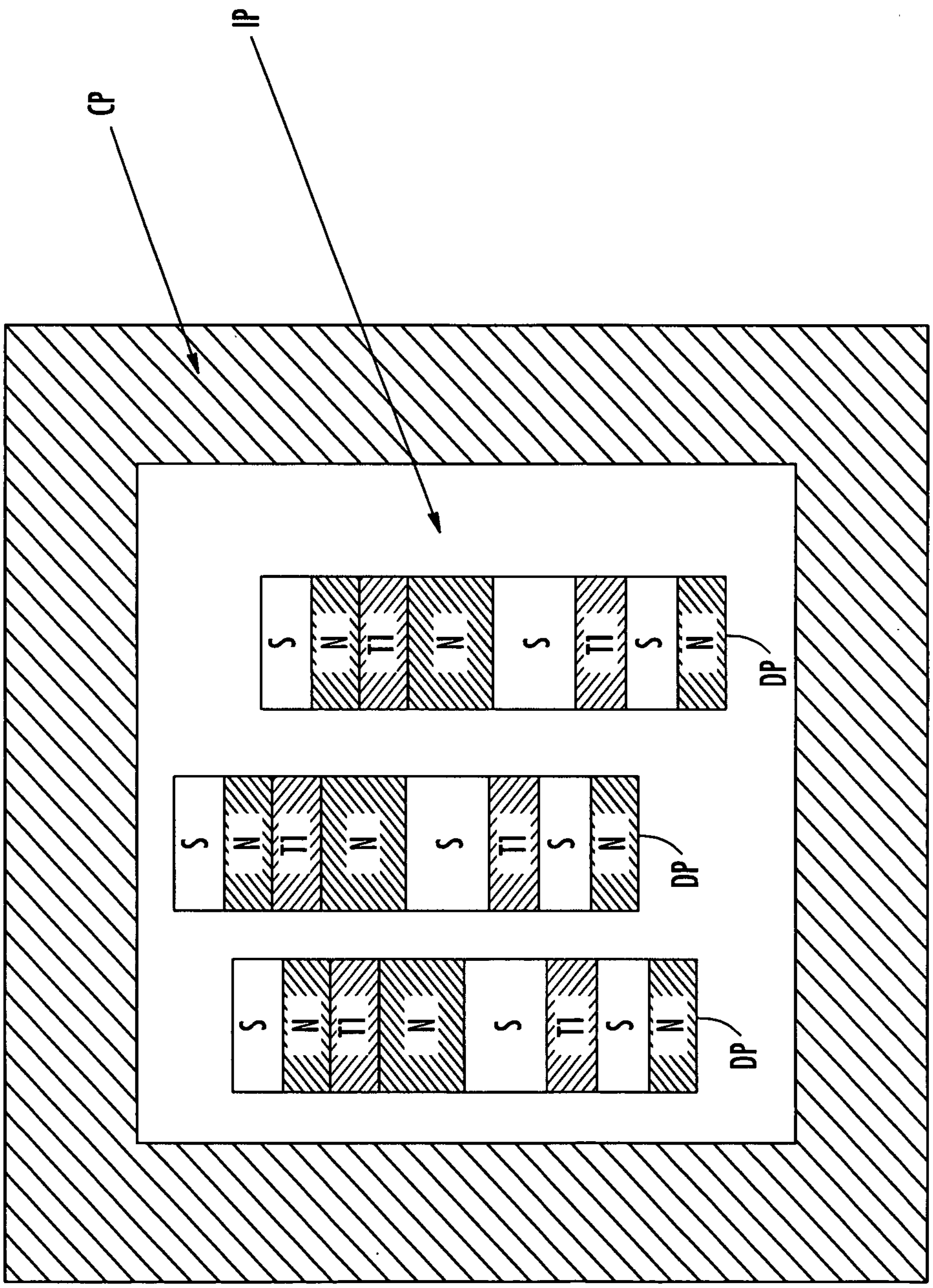


FIG. 6F

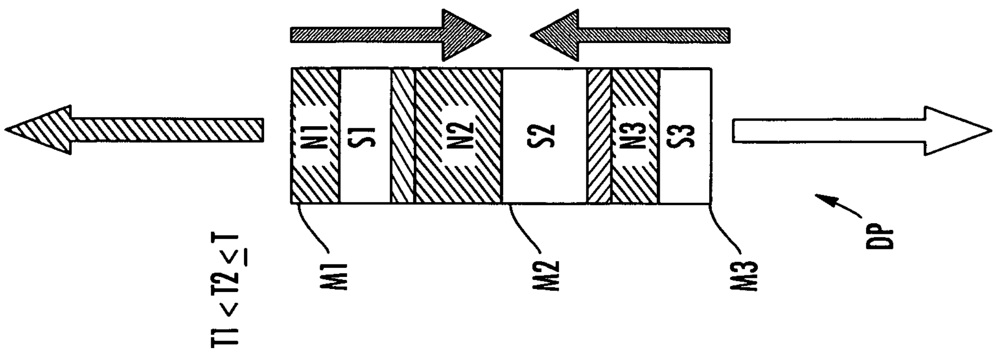


FIG. 7C

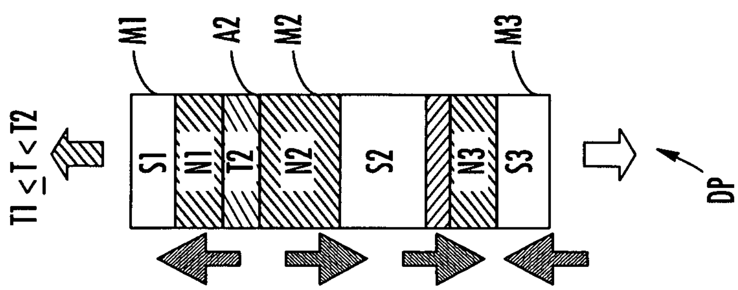


FIG. 7B

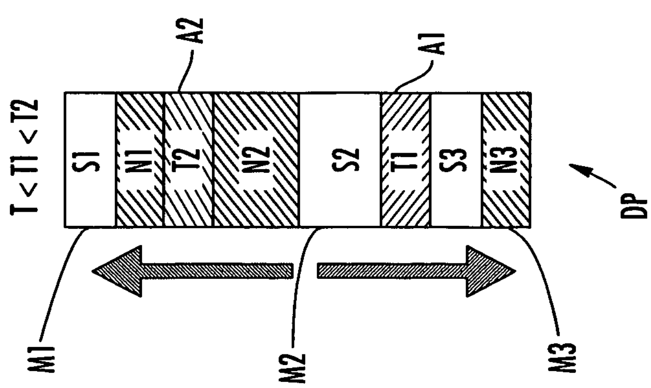


FIG. 7A

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices
for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

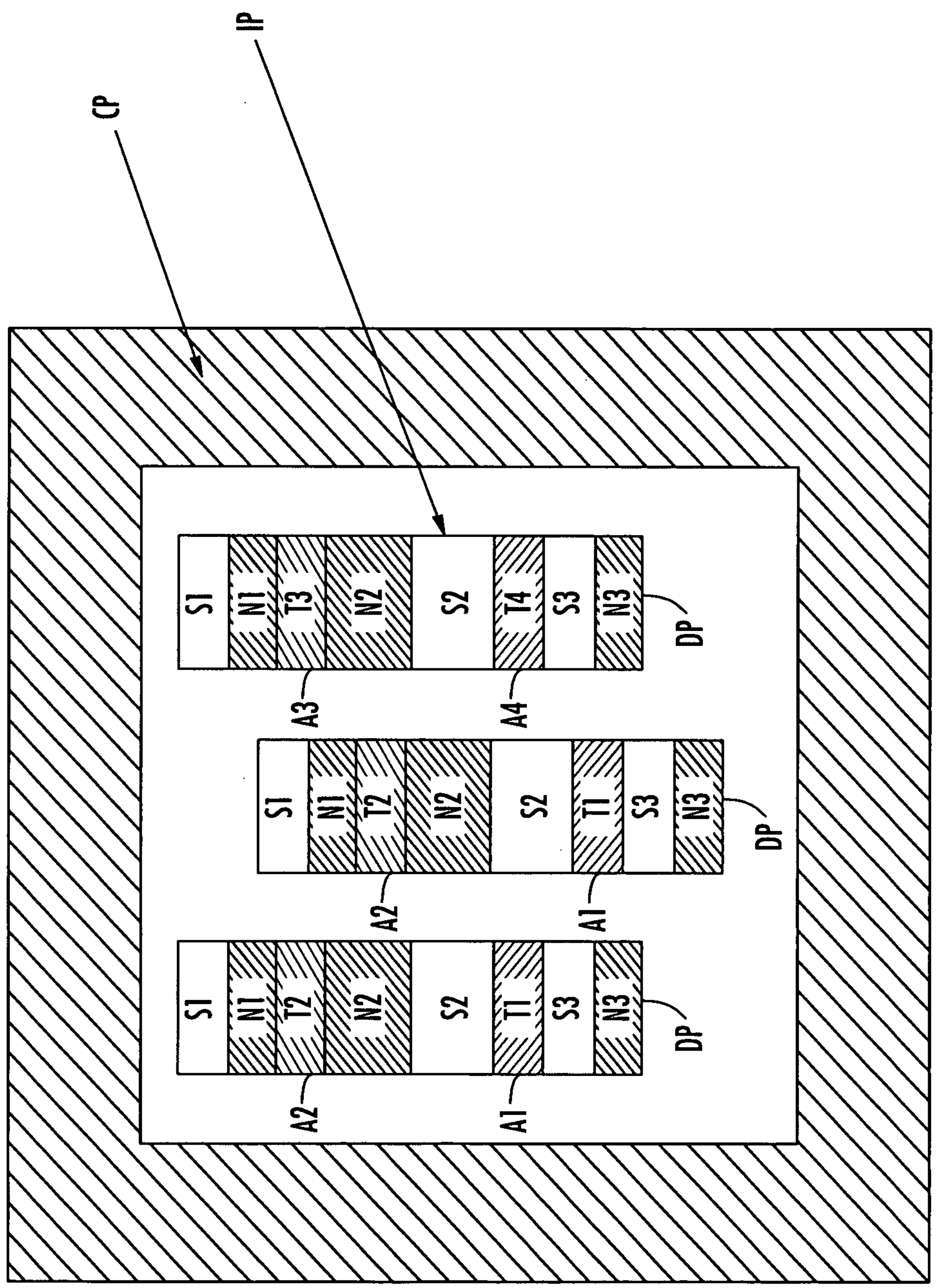


FIG. 7D

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

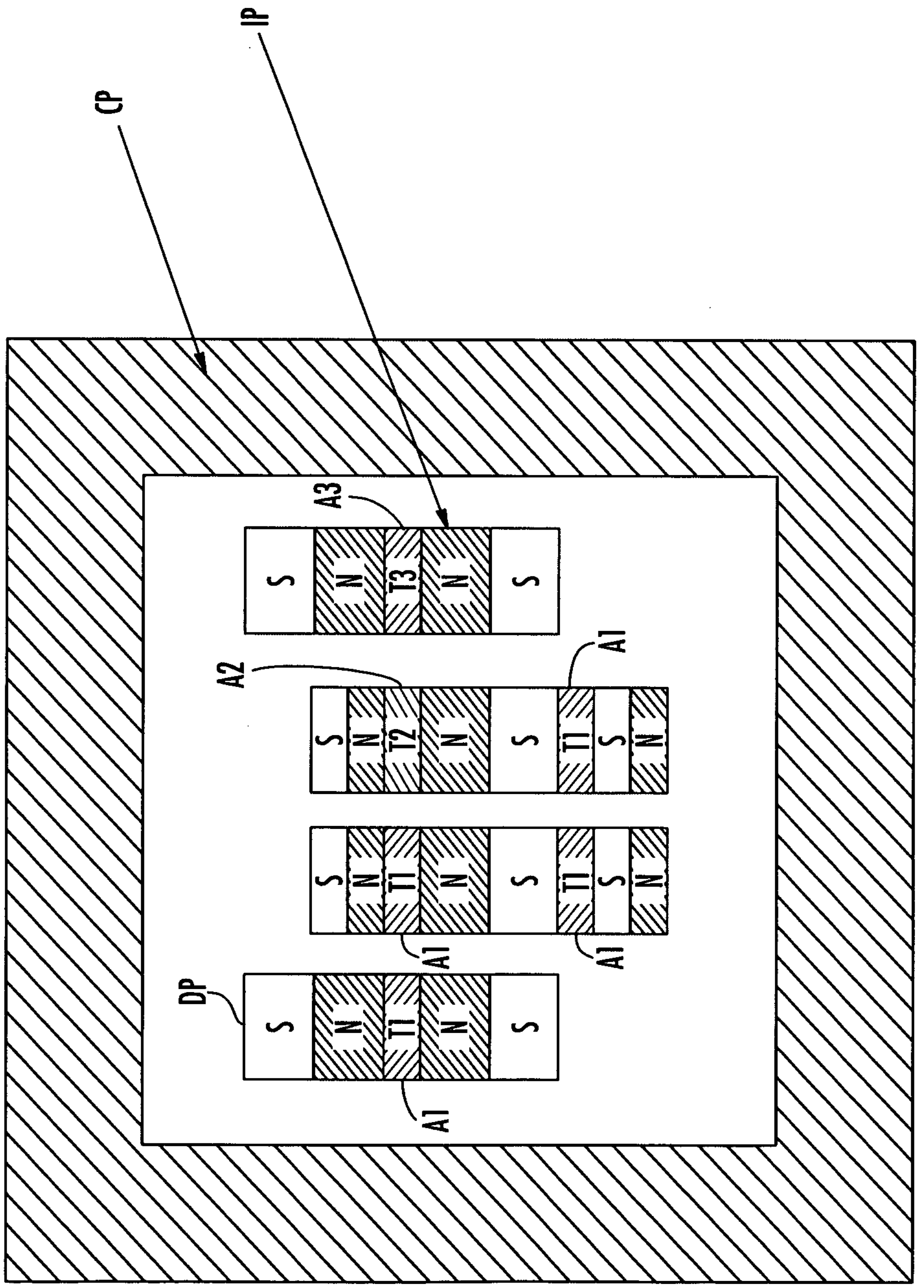


FIG. 7E

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices
for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

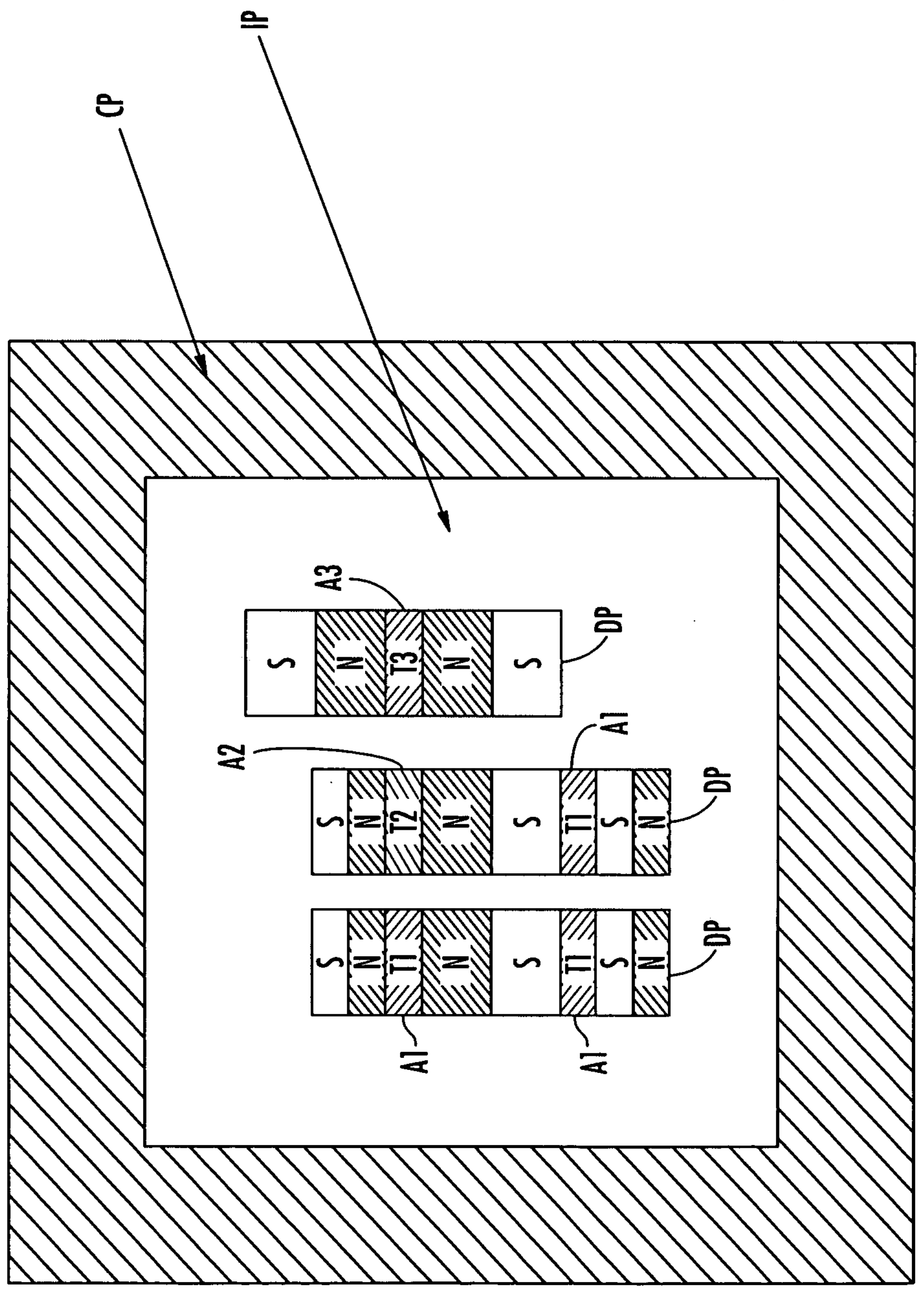


FIG. 7F

REPLACEMENT DRAWING

Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

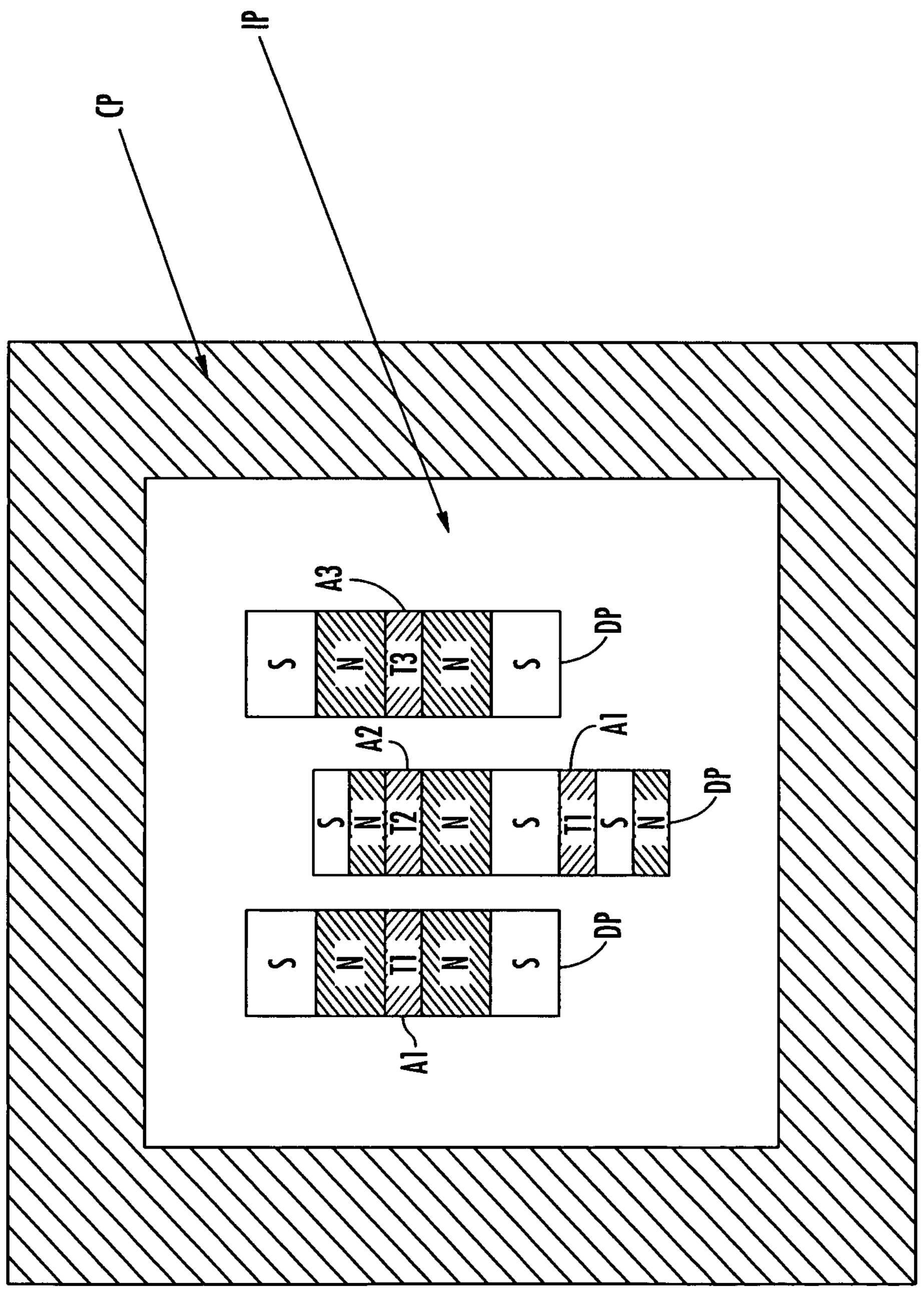


FIG. 7G

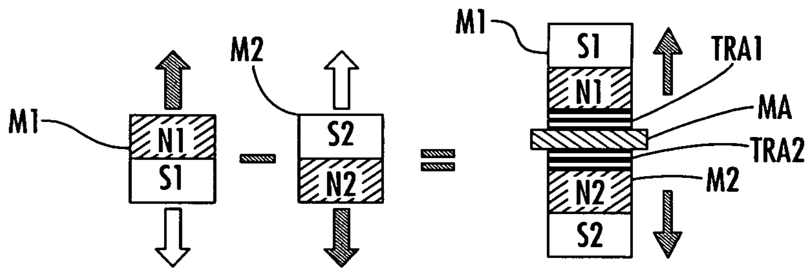


FIG. 8

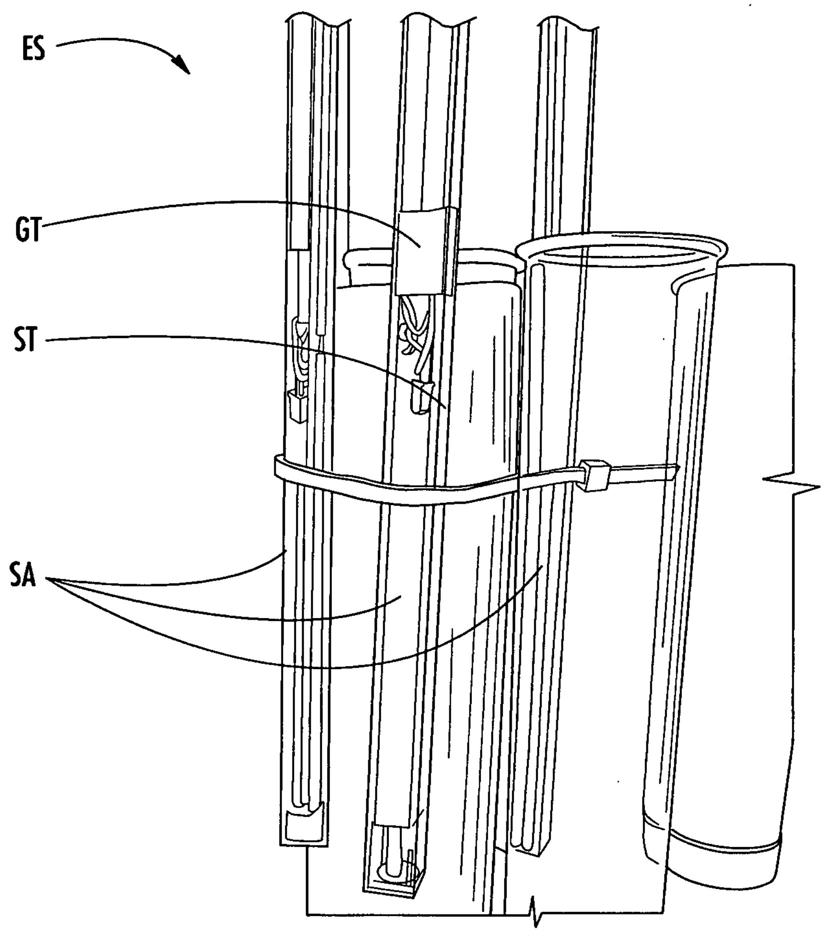


FIG. 9

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices
for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

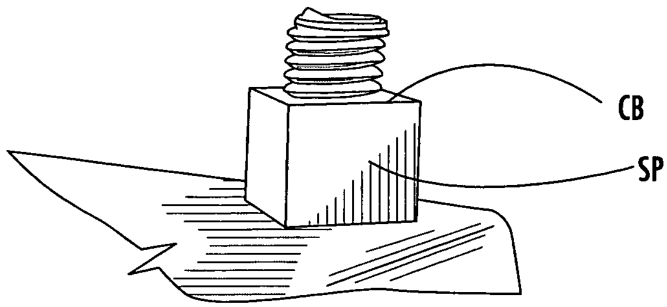


FIG. 10

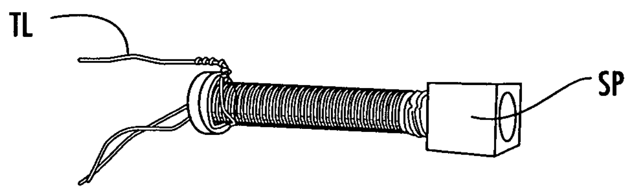


FIG. 11

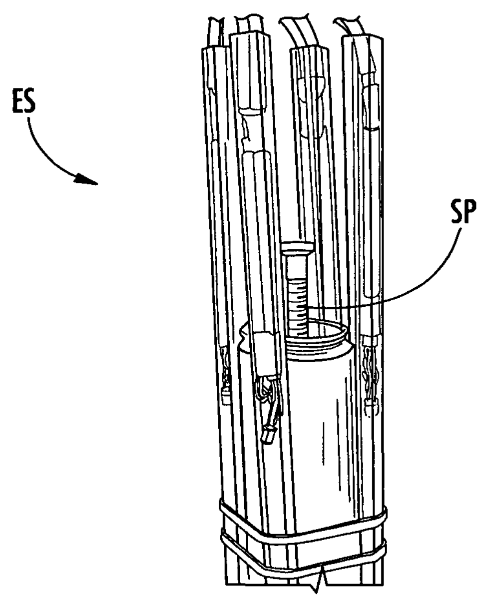


FIG. 12

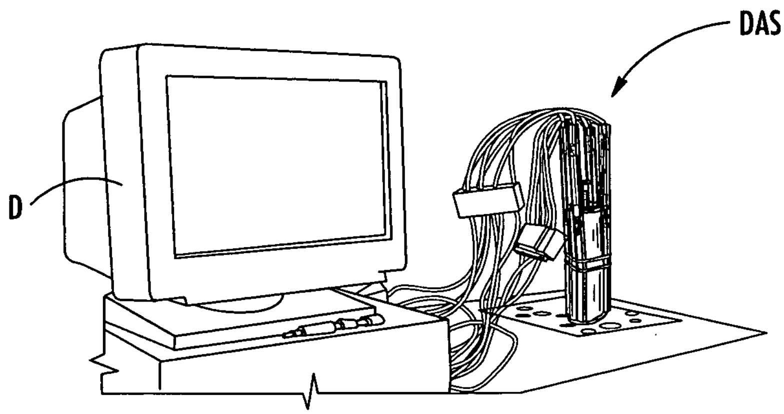


FIG. 13

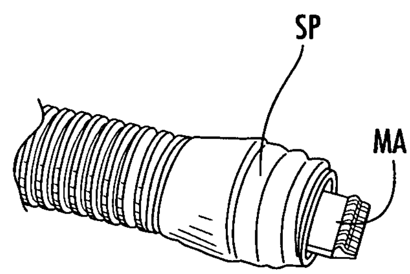


FIG. 14A

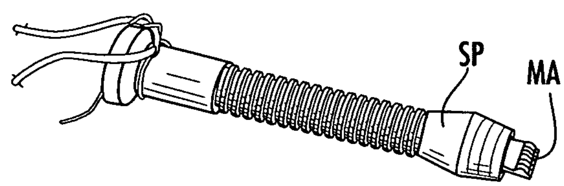


FIG. 14B

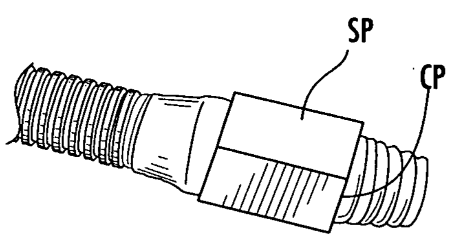


FIG. 14C

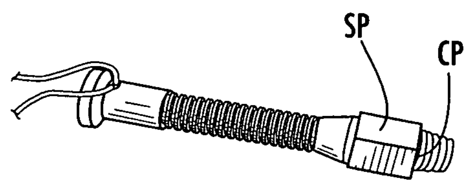


FIG. 14D

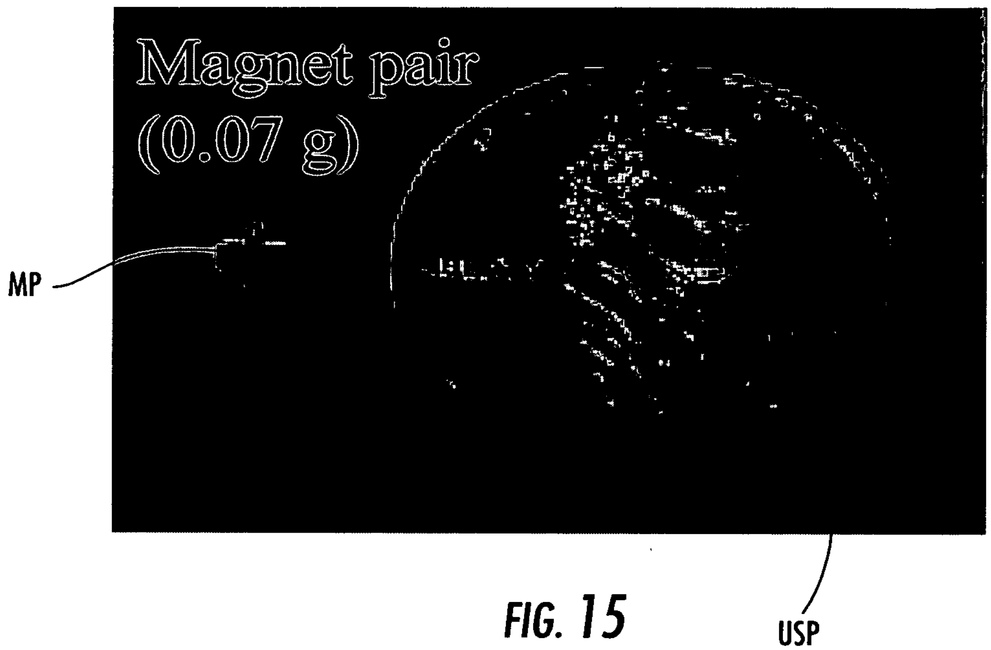


FIG. 15

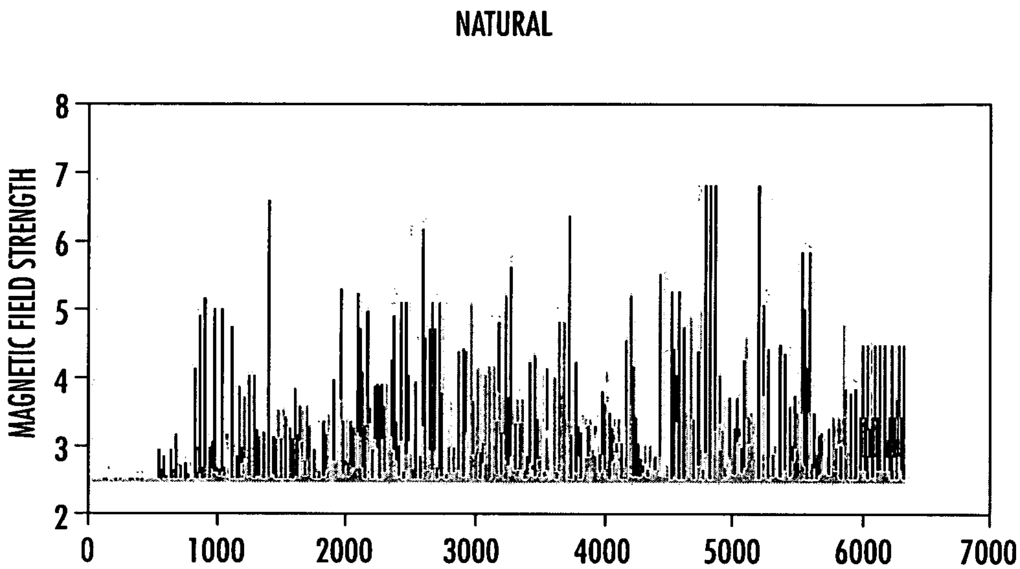

NATURAL
MAGNETIC FIELD STRENGTH
8
7
6
5
4
3
2
0
1000
2000
3000
4000
5000
6000
7000

FIG. 16

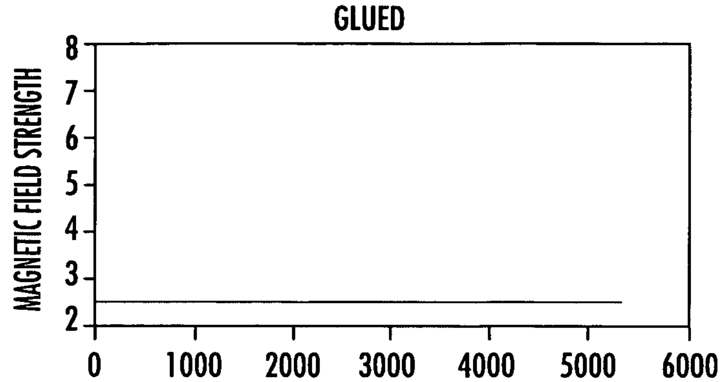


FIG. 17

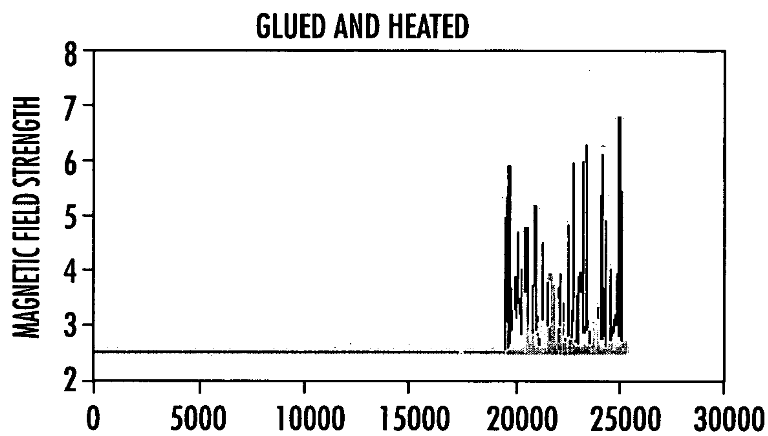


FIG. 18

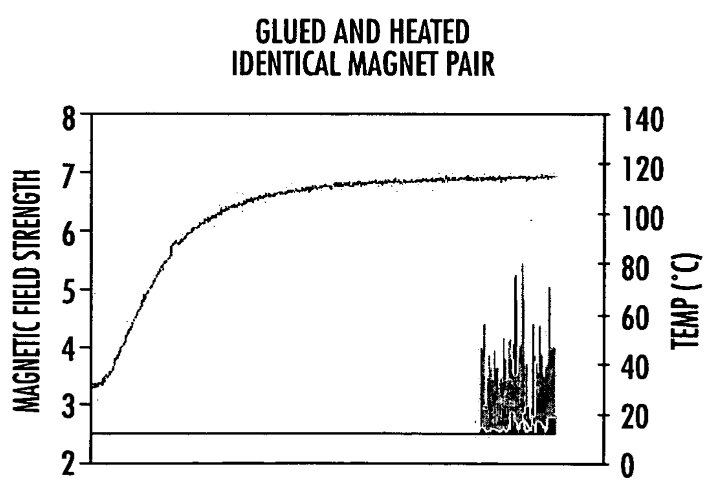


FIG. 19

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

GLUED AND HEATED
NON-IDENTICAL MAGNETIC PAIR

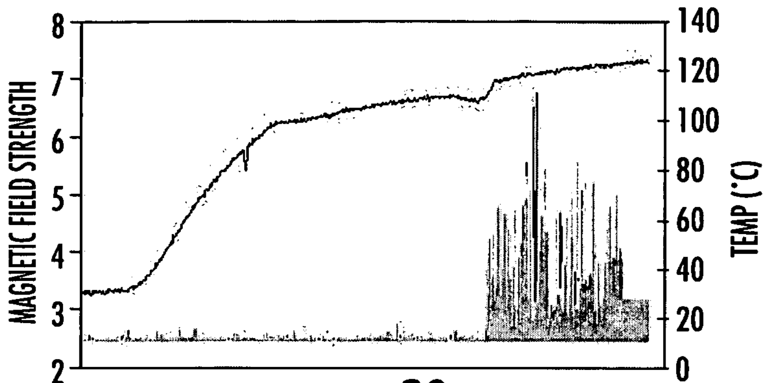


FIG. 20

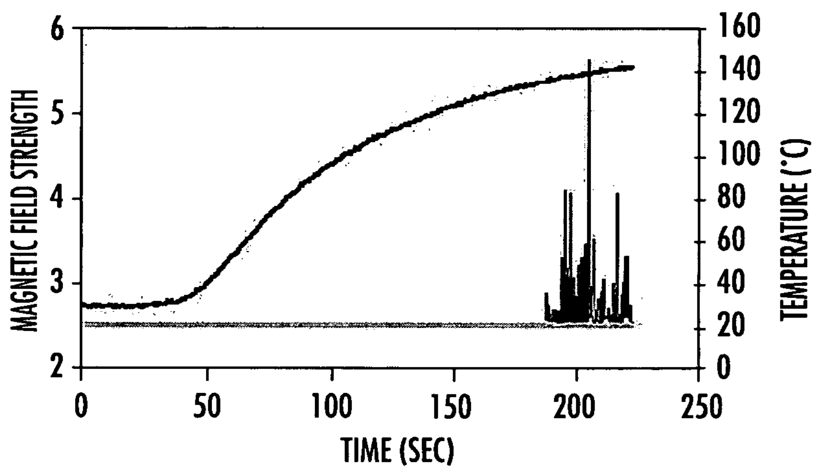


FIG. 21

MAGNETIC PAIR + SINGLE MAGNET

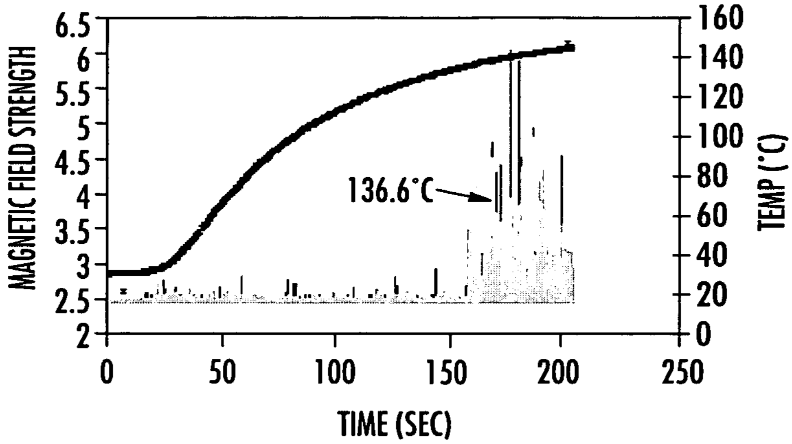


FIG. 22

SOLDER1 (MP = 138.3°C)

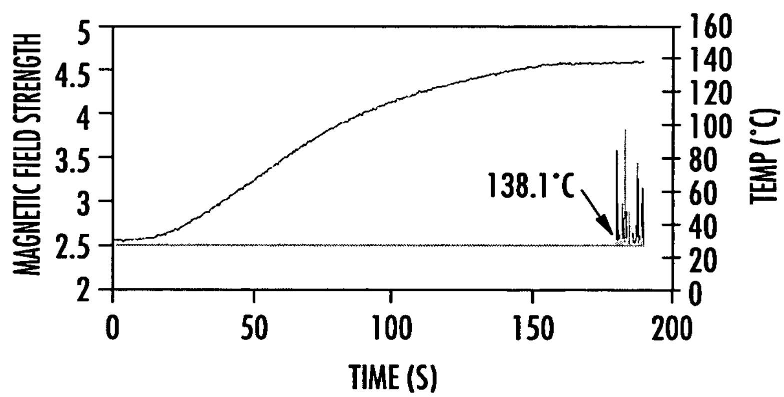


FIG. 23

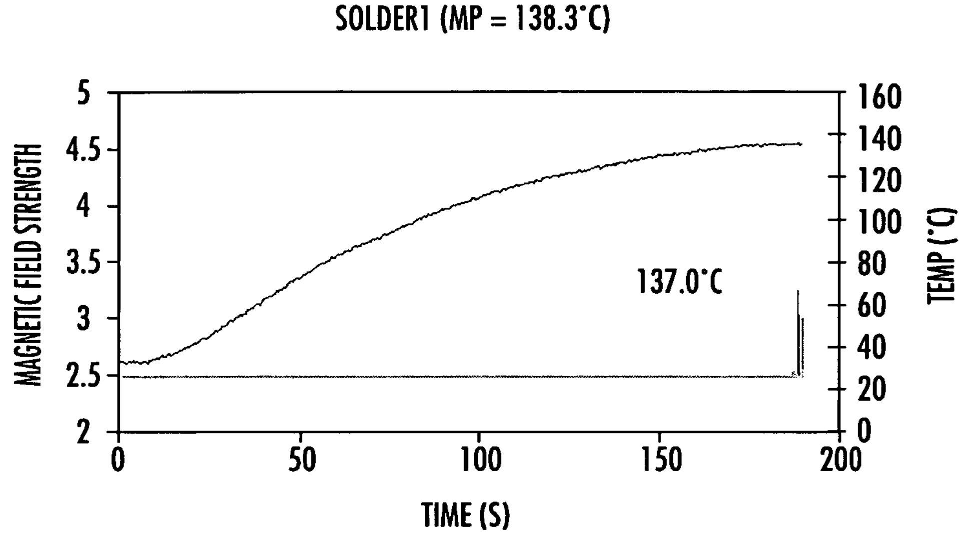

SOLDER1 (MP = 138.3°C)
MAGNETIC FIELD STRENGTH
TEMP (°C)
TIME (S)
137.0°C
5
4.5
4
3.5
3
2.5
2
160
140
120
100
80
60
40
20
0
0
50
100
150
200

FIG. 24

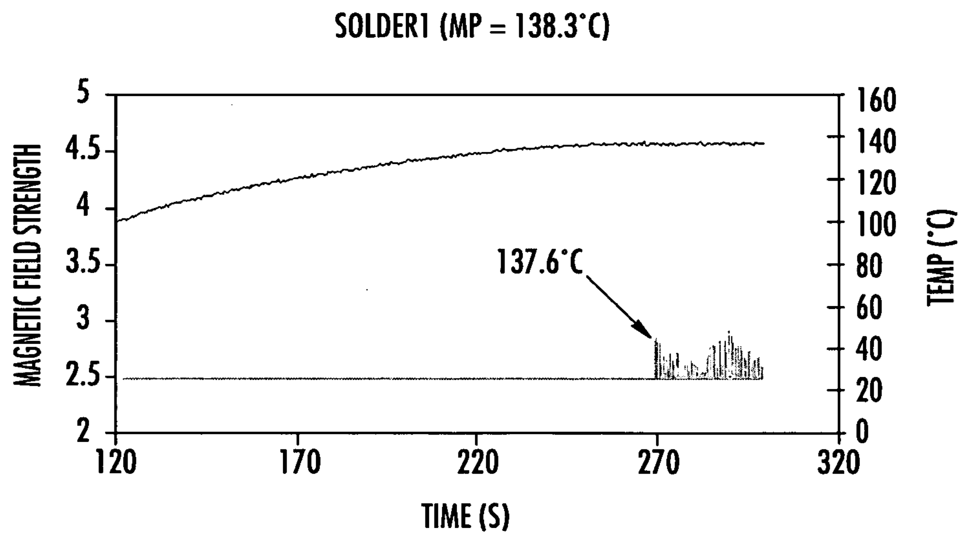

SOLDER1 (MP = 138.3°C)
MAGNETIC FIELD STRENGTH
TEMP (°C)
TIME (S)
137.6°C
5
4.5
4
3.5
3
2.5
2
160
140
120
100
80
60
40
20
0
120
170
220
270
320

FIG. 25

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

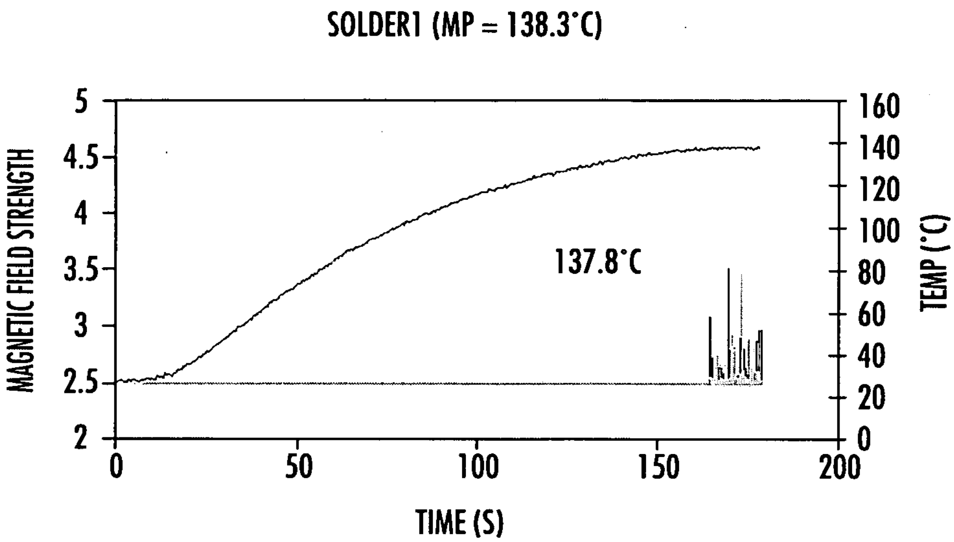


FIG. 26

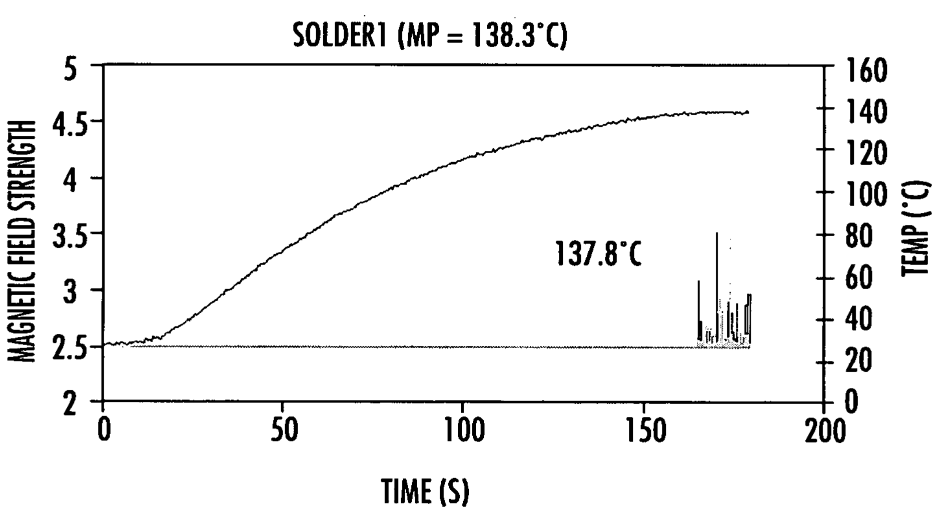


FIG. 27

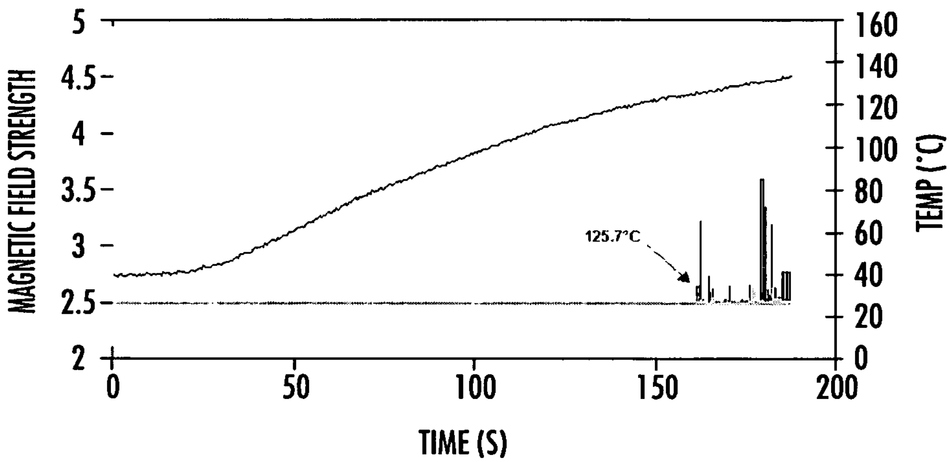

SOLDER2 (MP = 123.9°C)
MAGNETIC FIELD STRENGTH
TEMP (°C)
TIME (S)
125.7°C
5
4.5
4
3.5
3
2.5
2
160
140
120
100
80
60
40
20
0
50
150
200

FIG. 28

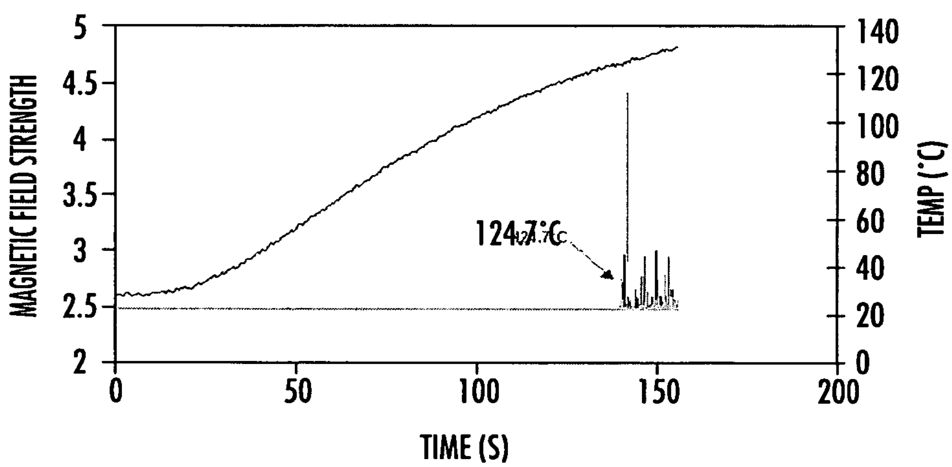

SOLDER2 (MP = 123.9°C)
MAGNETIC FIELD STRENGTH
TEMP (°C)
TIME (S)
124.7°C
5
4.5
4
3.5
3
2.5
2
140
120
100
80
60
40
20
0
50
150
200

FIG. 29

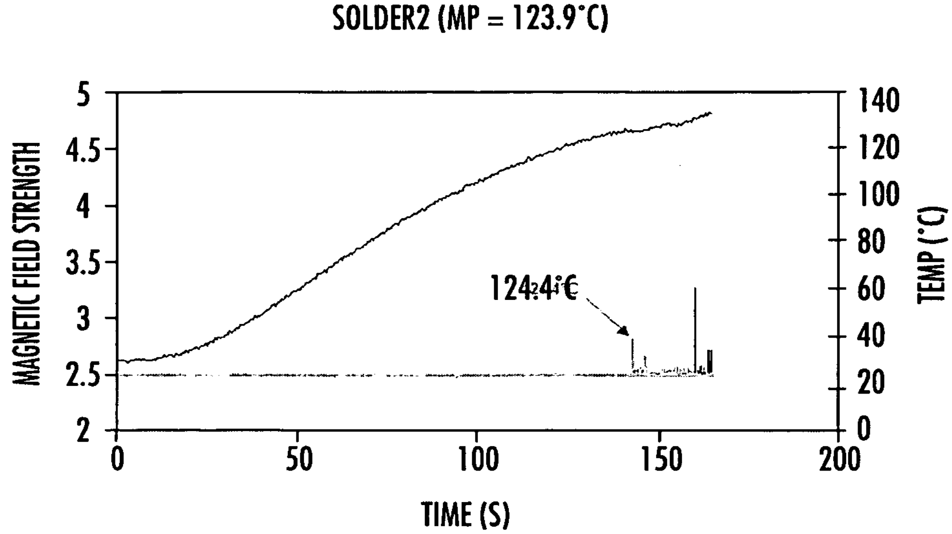

SOLDER2 (MP = 123.9°C)
MAGNETIC FIELD STRENGTH
5
4.5
4
3.5
3
2.5
2
TEMP (°C)
140
120
100
80
60
40
20
0
124.4°C
TIME (S)
0
50
100
150
200

FIG. 30

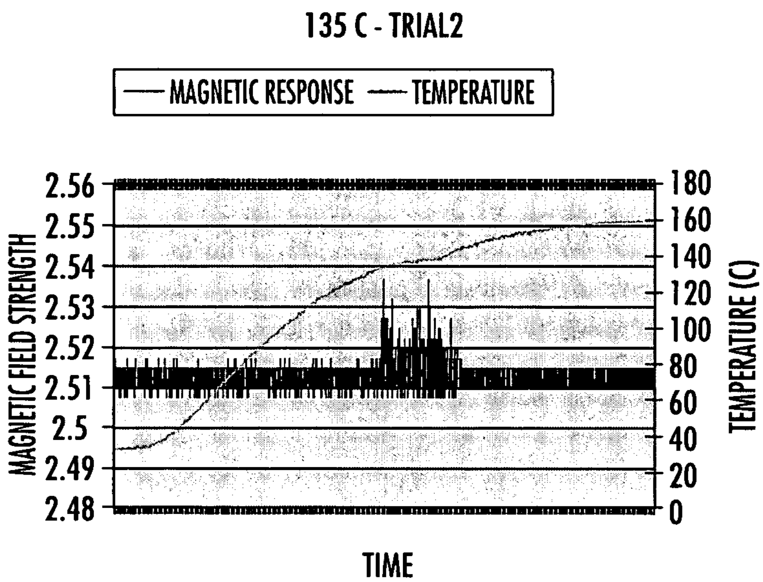

135 C - TRIAL2
MAGNETIC RESPONSE
TEMPERATURE
MAGNETIC FIELD STRENGTH
2.56
2.55
2.54
2.53
2.52
2.51
2.5
2.49
2.48
TEMPERATURE (C)
180
160
140
120
100
80
60
40
20
0
TIME

FIG. 31

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices
for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

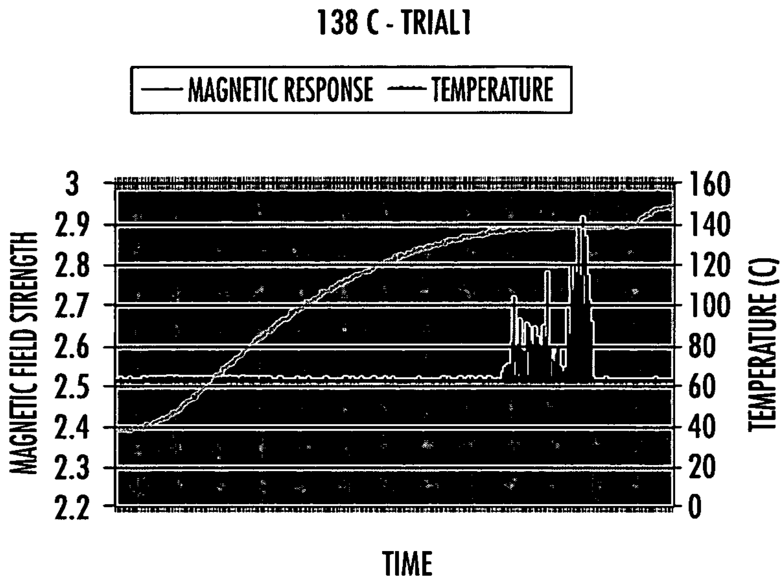


FIG. 32

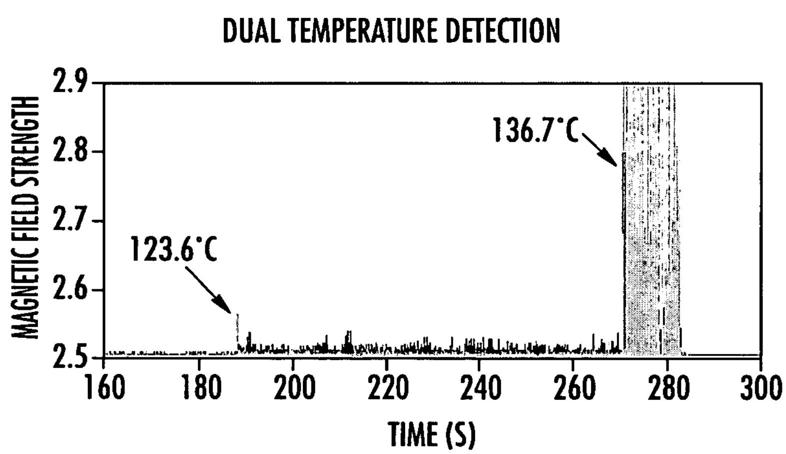


FIG. 33

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices
for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

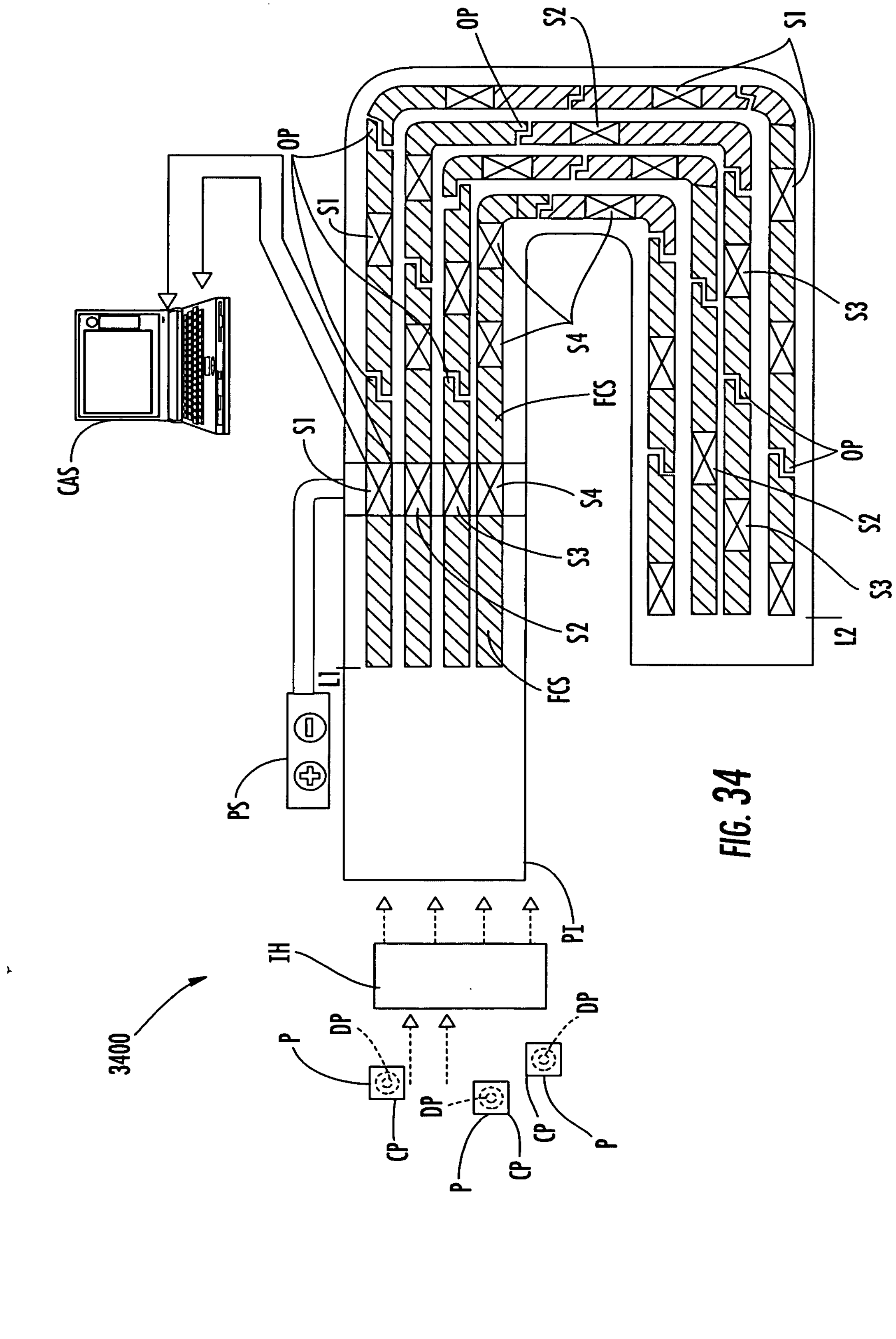


FIG. 34

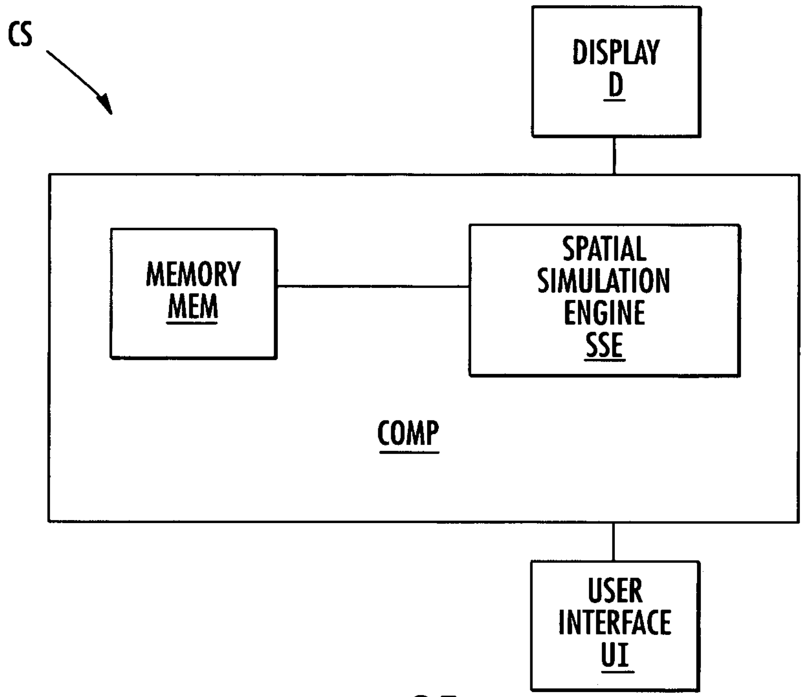

CS
DISPLAY
D
MEMORY
MEM
SPATIAL
SIMULATION
ENGINE
SSE
COMP
USER
INTERFACE
UI

FIG. 35

REPLACEMENT DRAWING

Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

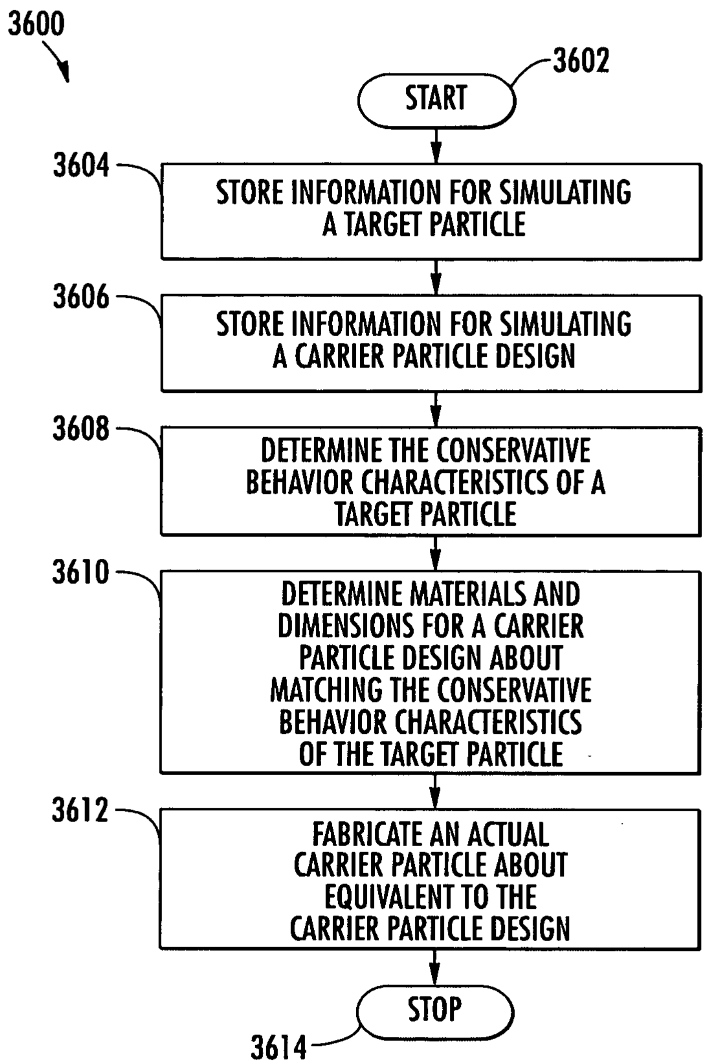


FIG. 36

FIG. 37

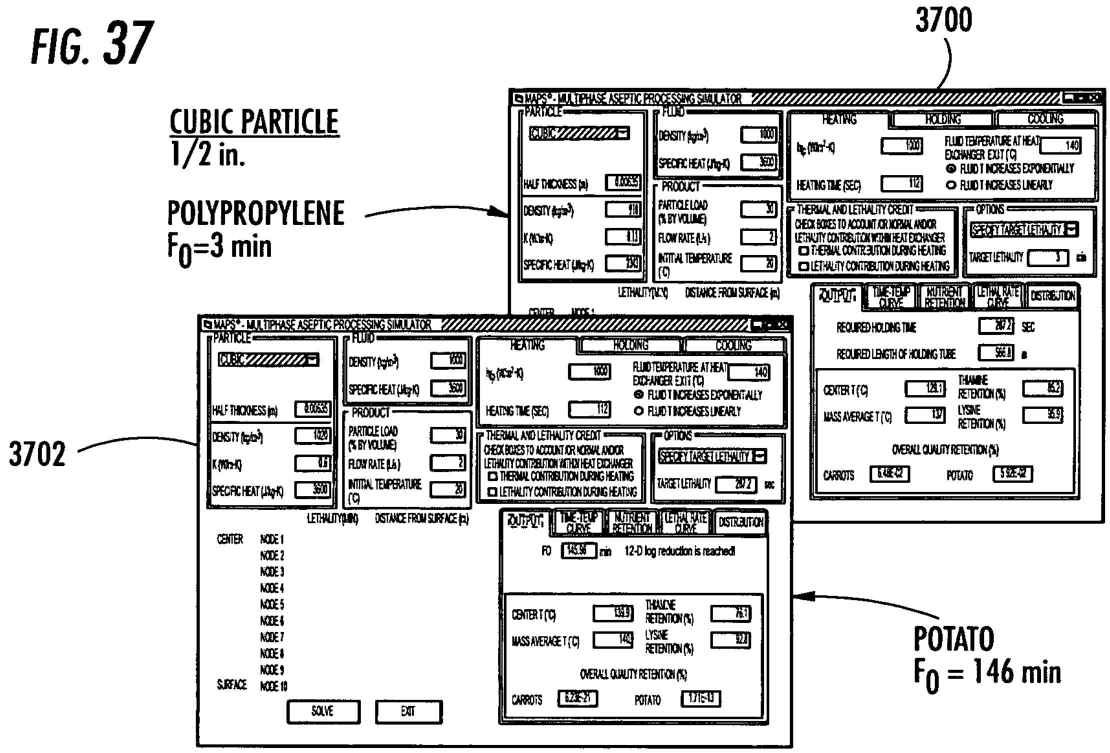
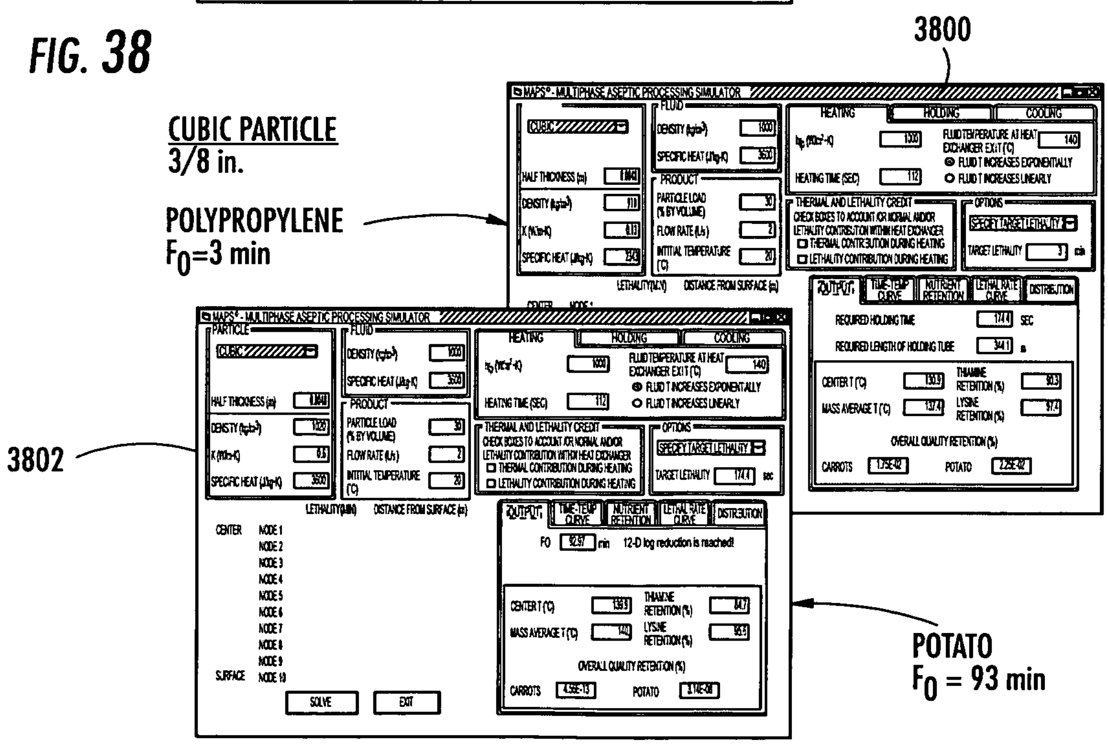

3700
CUBIC PARTICLE
1/2 in.
POLYPROPYLENE
F_0=3 min
3702
POTATO
F_0 = 146 min

FIG. 38


3800
CUBIC PARTICLE
3/8 in.
POLYPROPYLENE
F_0=3 min
3802
POTATO
F_0 = 93 min

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

FIG. 39

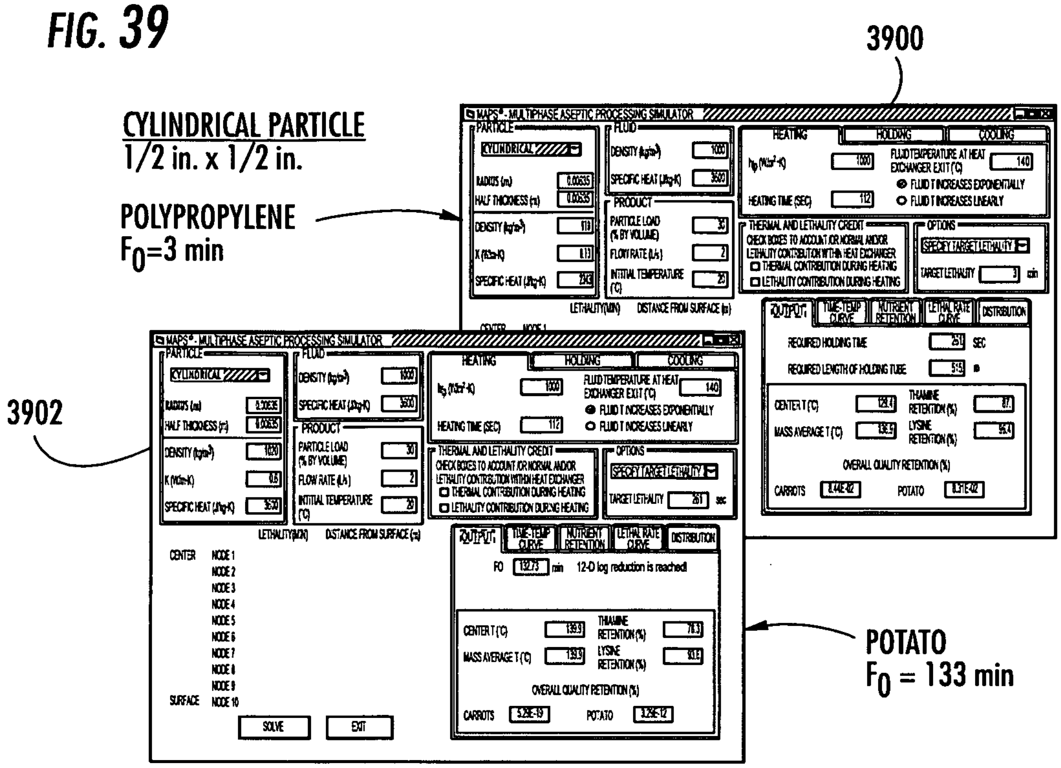
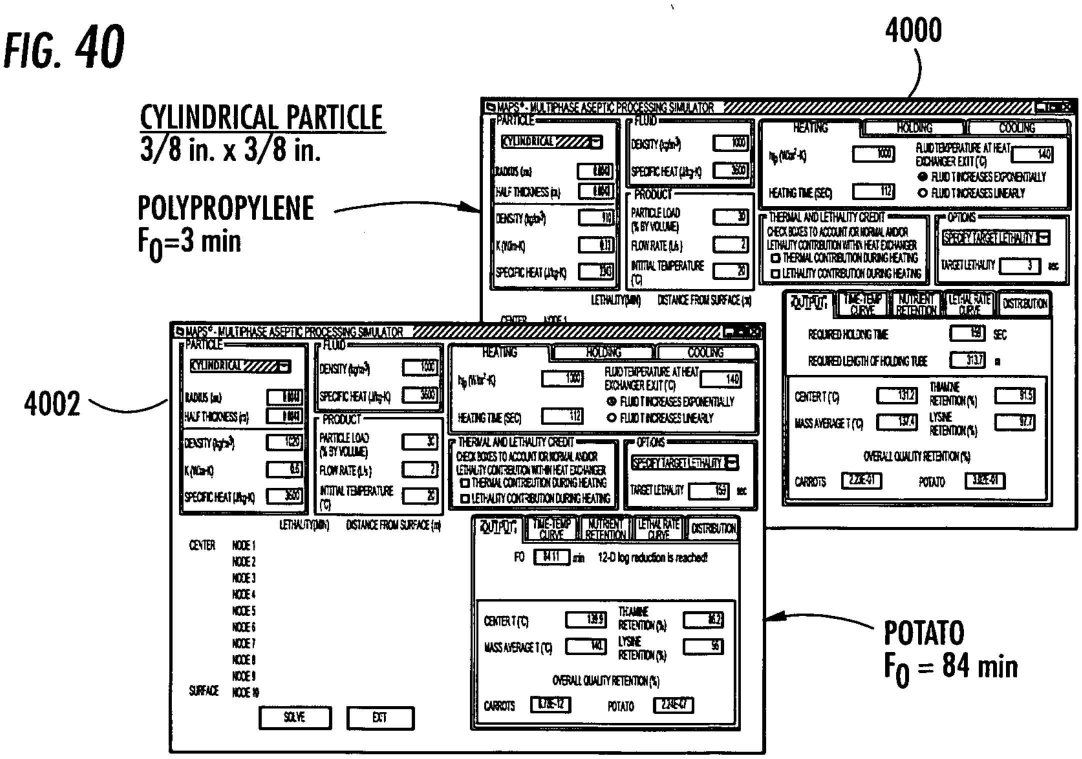


FIG. 40



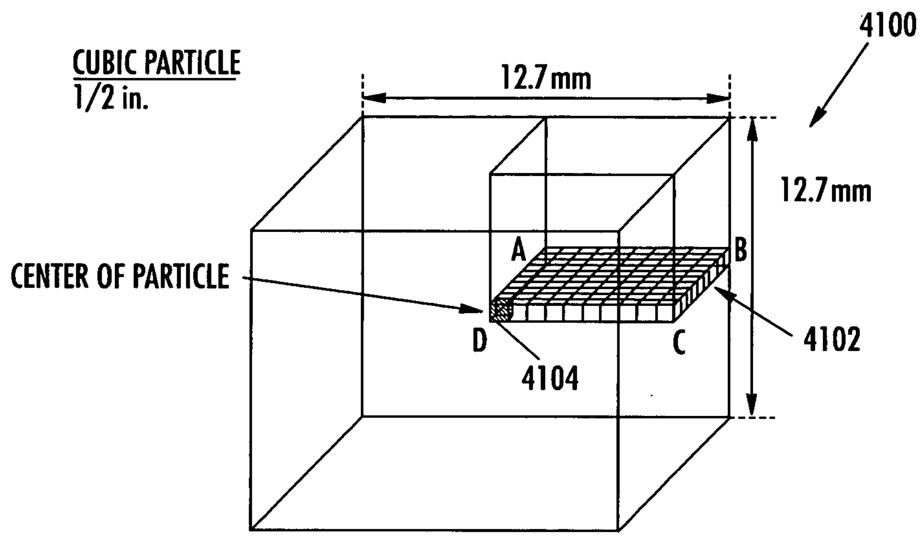

4100
CUBIC PARTICLE
1/2 in.
12.7mm
12.7mm
CENTER OF PARTICLE
A
B
C
D
4102
4104

FIG. 41

POTATO
1/2 IN.
F_0(CENTER) = 3 MIN.
TIME = 131.4 s
(HOLDING ONLY)
$\alpha = 1.63 \times 10^{-7} m2/s$

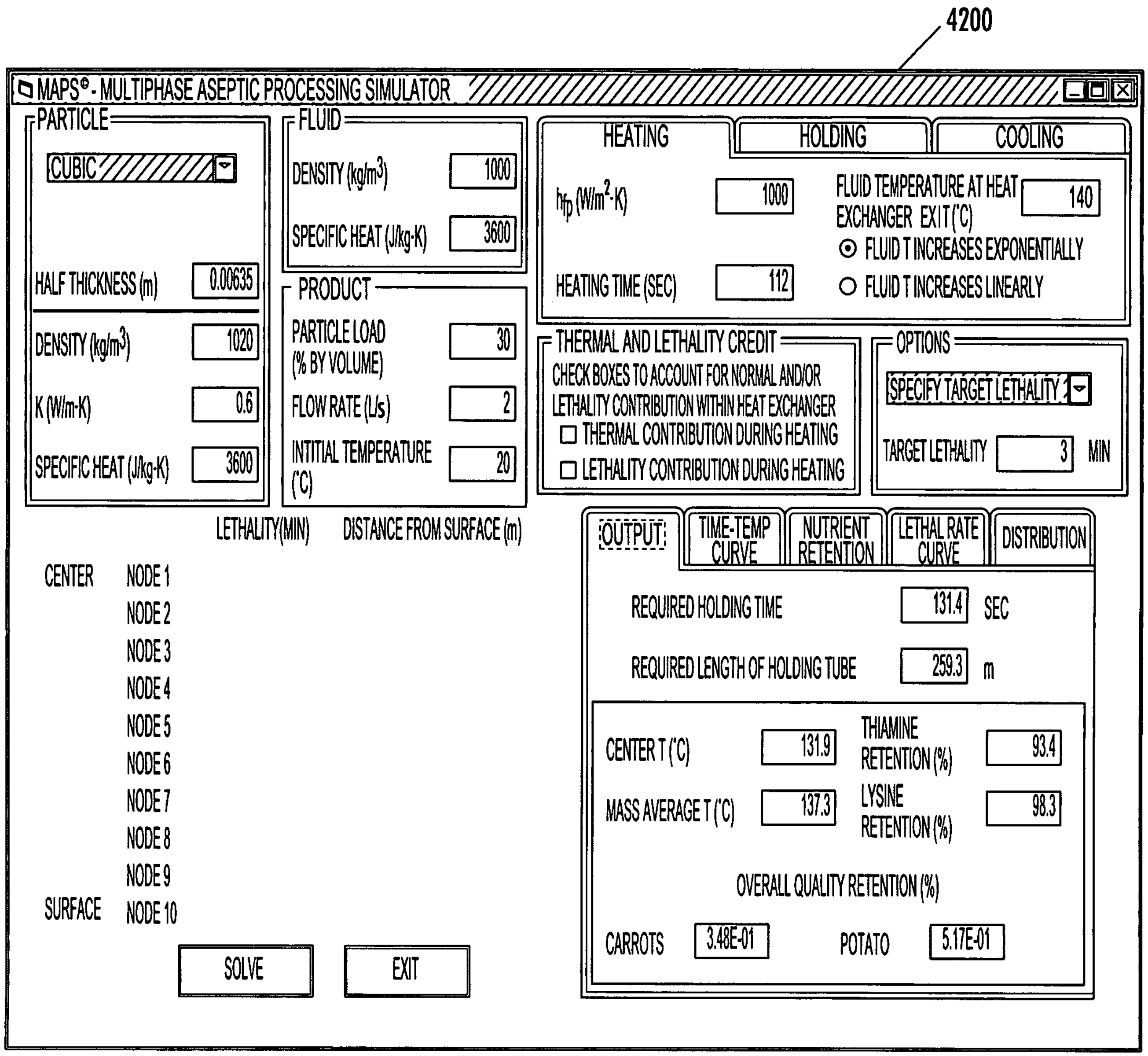


FIG. 42

POTATO
1/2 IN.

A 6.35 mm B 4300

37.2	38.0	39.4	41.7	45.1	49.7	56.0	64.8	77.5	97.2
21.3	21.9	23.0	24.9	27.7	31.6	37.1	45.1	57.3	77.5
13.6	14.0	14.9	16.4	18.7	22.0	26.7	33.9	45.1	64.8
9.3	9.6	10.4	11.6	13.5	16.2	20.4	26.7	37.1	56.0
6.7	7.0	7.6	8.6	10.2	12.6	16.2	22.0	31.6	49.7
5.1	5.4	5.9	6.8	8.1	10.2	13.5	18.7	27.7	45.1
4.1	4.4	4.8	5.6	6.8	8.6	11.6	16.4	24.9	41.7
3.5	3.7	4.1	4.8	5.9	7.6	10.4	14.9	23.0	39.4
3.2	3.3	3.7	4.4	5.4	7.0	9.6	14.0	21.9	38.0
3.0	3.2	3.5	4.1	5.1	6.7	9.3	13.6	21.3	37.2

6.35 mm

D 4104 4102 C

FIG. 43

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

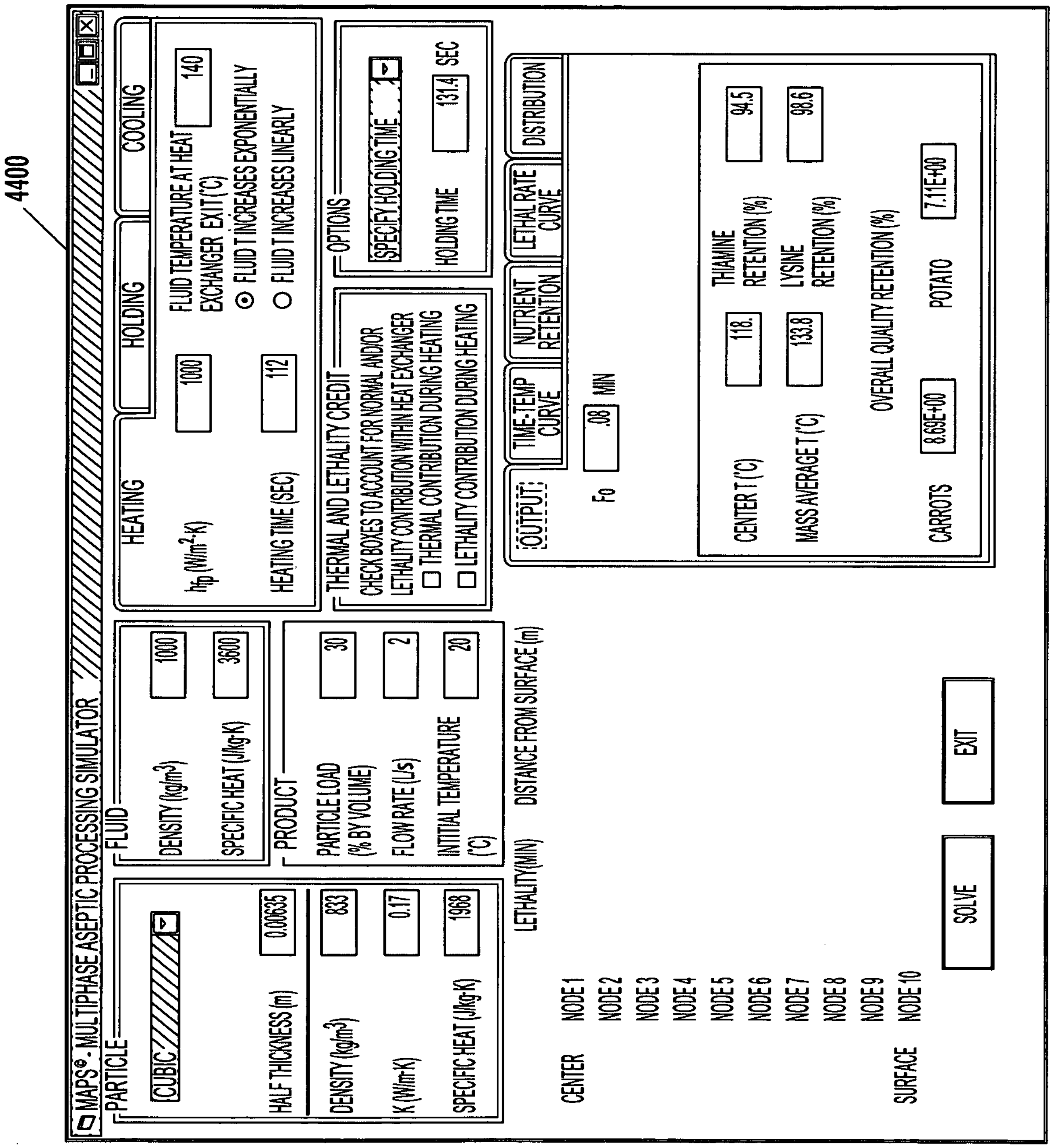
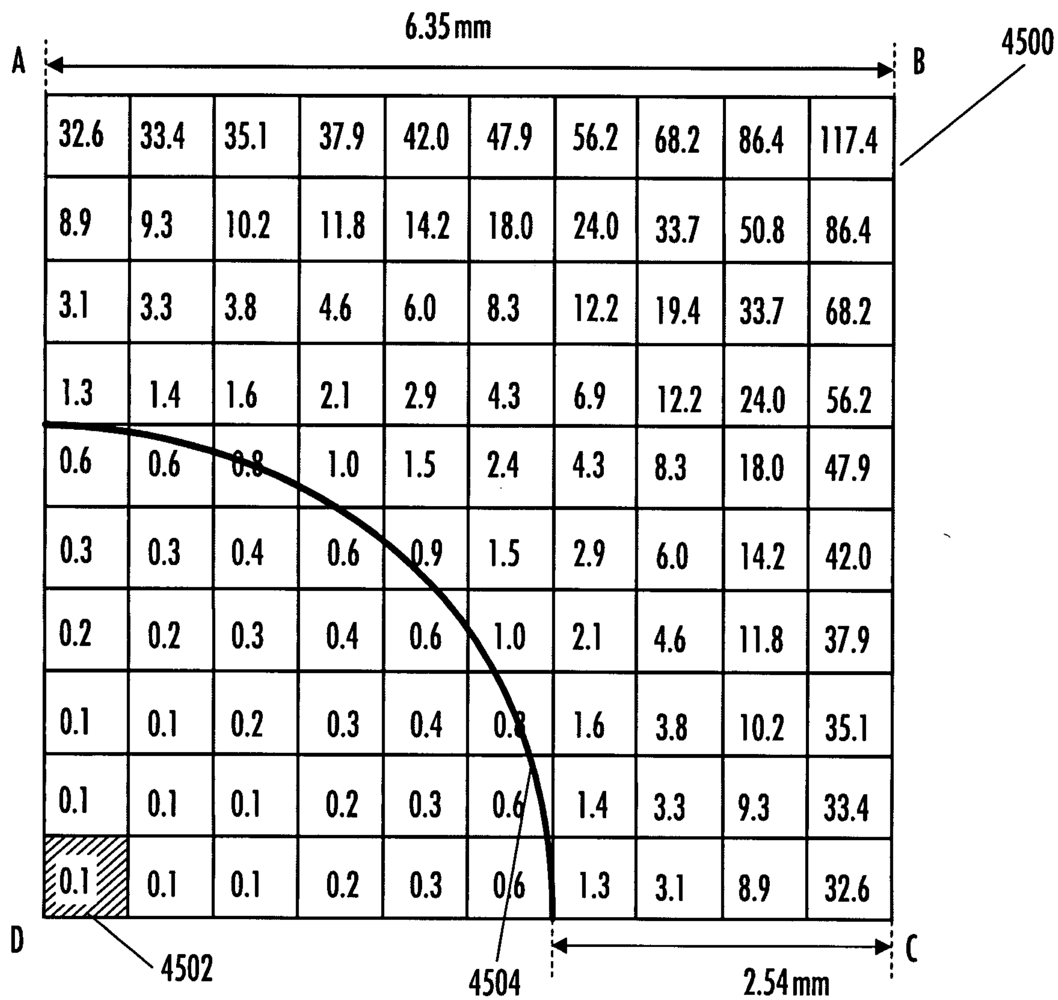


FIG. 44

TPX
1/2 IN.
TIME = 131.4 s
(HOLDING ONLY)
$\alpha = 1.04 \times 10^{-7}\ m^2/s$

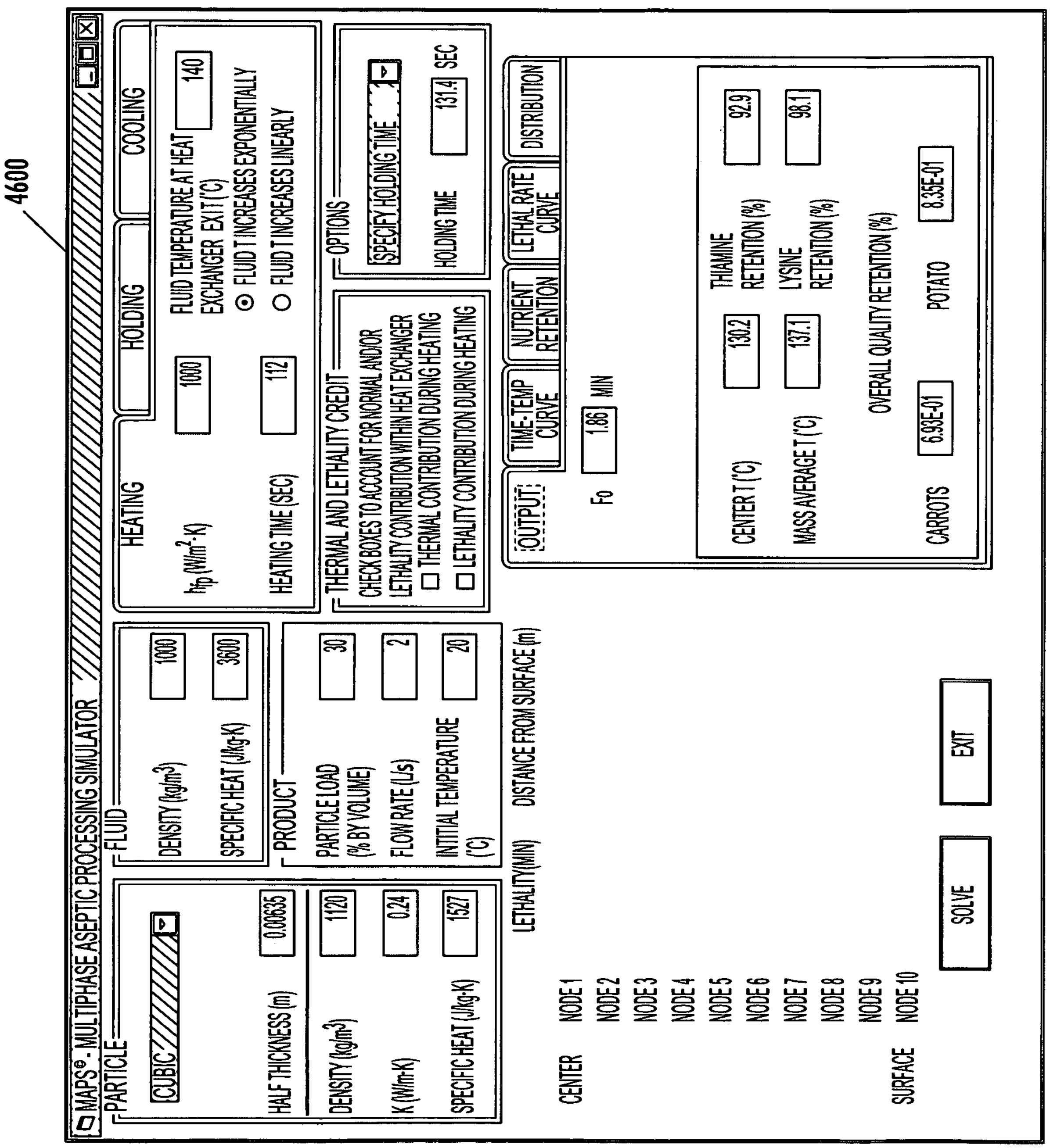
TPX
1/2 IN.



32.6	33.4	35.1	37.9	42.0	47.9	56.2	68.2	86.4	117.4
8.9	9.3	10.2	11.8	14.2	18.0	24.0	33.7	50.8	86.4
3.1	3.3	3.8	4.6	6.0	8.3	12.2	19.4	33.7	68.2
1.3	1.4	1.6	2.1	2.9	4.3	6.9	12.2	24.0	56.2
0.6	0.6	0.8	1.0	1.5	2.4	4.3	8.3	18.0	47.9
0.3	0.3	0.4	0.6	0.9	1.5	2.9	6.0	14.2	42.0
0.2	0.2	0.3	0.4	0.6	1.0	2.1	4.6	11.8	37.9
0.1	0.1	0.2	0.3	0.4	0.8	1.6	3.8	10.2	35.1
0.1	0.1	0.1	0.2	0.3	0.6	1.4	3.3	9.3	33.4
0.1	0.1	0.1	0.2	0.3	0.6	1.3	3.1	8.9	32.6

FIG. 45

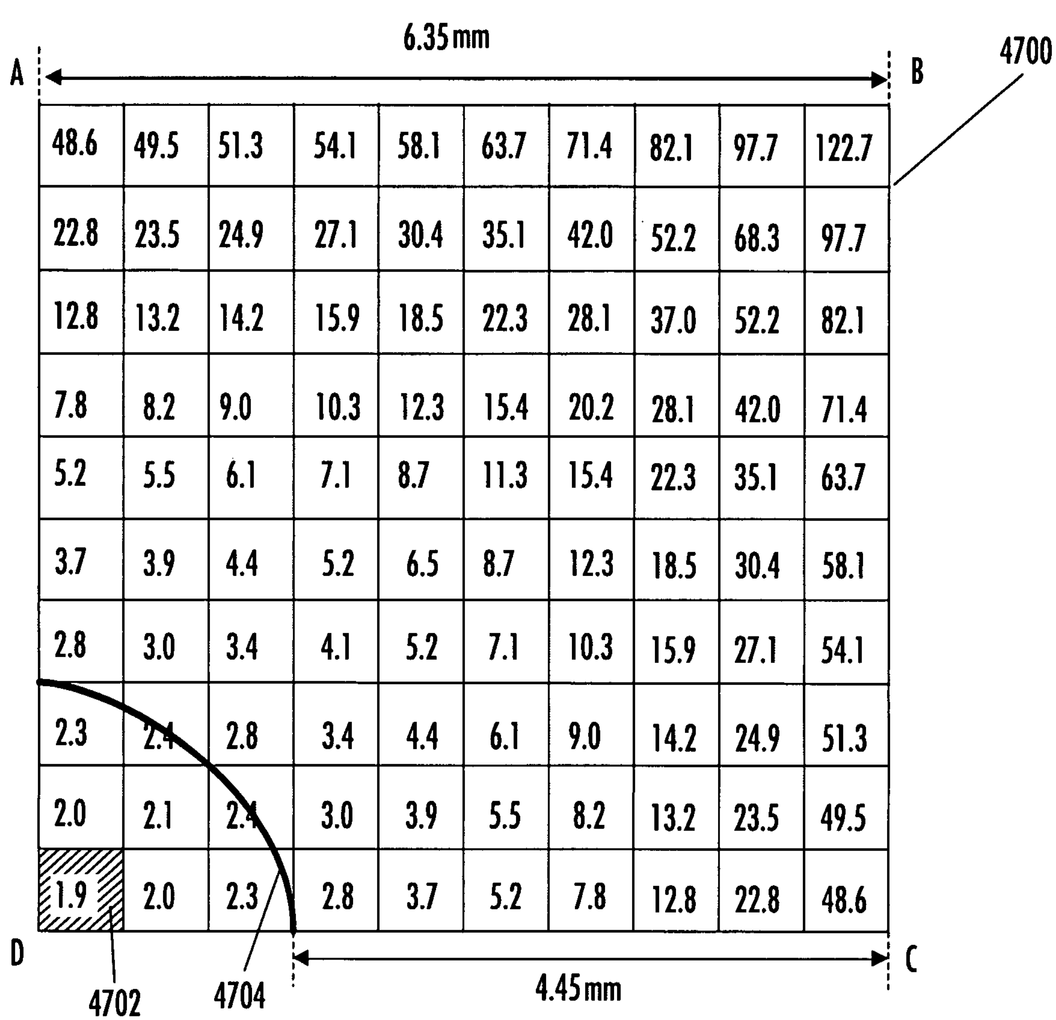
REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2



NYLON
1/2 IN.
TIME = 131.4 s
(HOLDING ONLY)
$\alpha = 1.40 \times 10^{-7} m^2/s$

FIG. 46

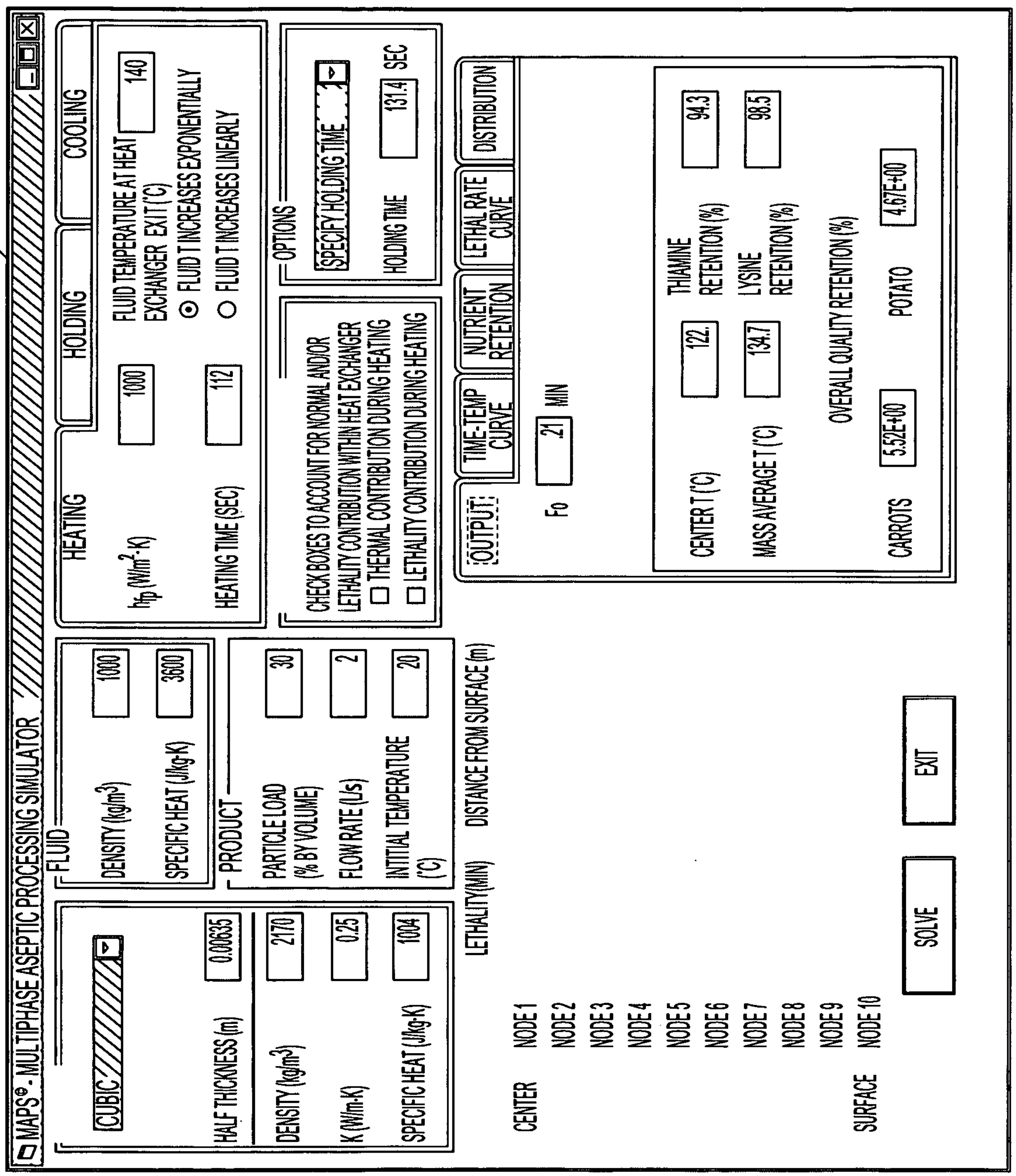
NYLON
1/2 IN.



48.6	49.5	51.3	54.1	58.1	63.7	71.4	82.1	97.7	122.7
22.8	23.5	24.9	27.1	30.4	35.1	42.0	52.2	68.3	97.7
12.8	13.2	14.2	15.9	18.5	22.3	28.1	37.0	52.2	82.1
7.8	8.2	9.0	10.3	12.3	15.4	20.2	28.1	42.0	71.4
5.2	5.5	6.1	7.1	8.7	11.3	15.4	22.3	35.1	63.7
3.7	3.9	4.4	5.2	6.5	8.7	12.3	18.5	30.4	58.1
2.8	3.0	3.4	4.1	5.2	7.1	10.3	15.9	27.1	54.1
2.3	2.4	2.8	3.4	4.4	6.1	9.0	14.2	24.9	51.3
2.0	2.1	2.4	3.0	3.9	5.5	8.2	13.2	23.5	49.5
1.9	2.0	2.3	2.8	3.7	5.2	7.8	12.8	22.8	48.6

FIG. 47

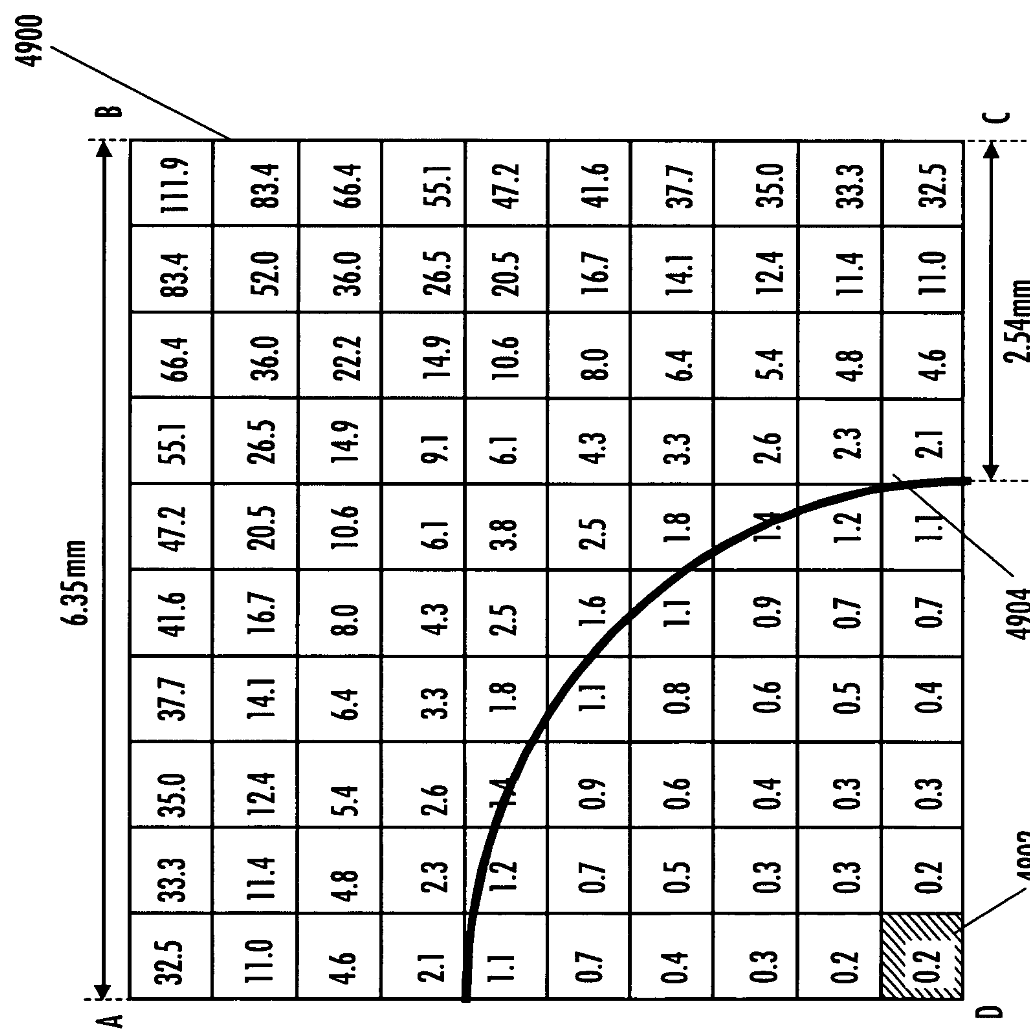
4800



TEFLON
1/2 IN.
TIME = 131.4 s
(HOLDING ONLY)
$\alpha = 1.15 \times 10^{-7} m^2/s$

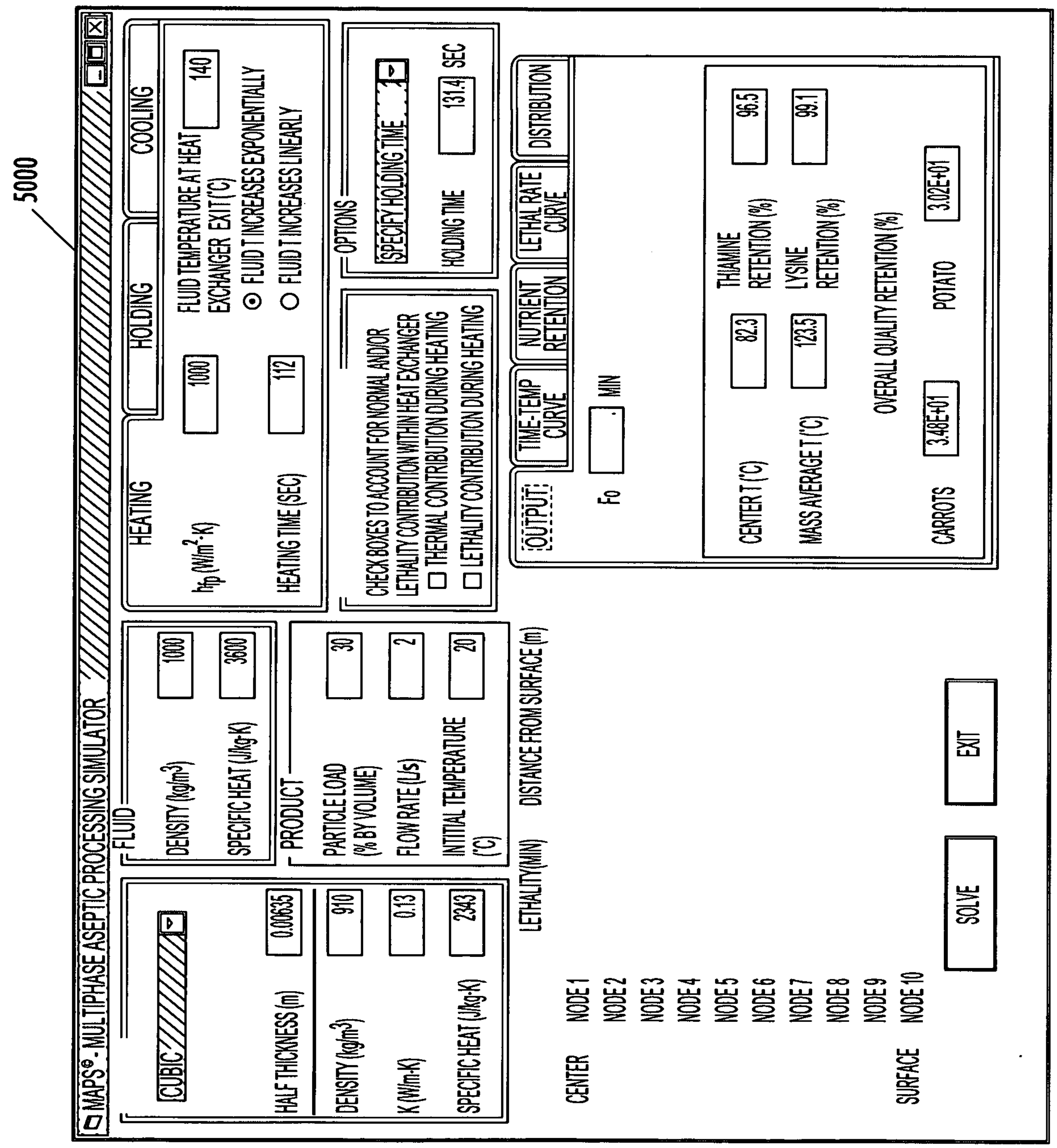
FIG. 48

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices
for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2



32.5	33.3	35.0	37.7	41.6	47.2	55.1	66.4	83.4	111.9
11.0	11.4	12.4	14.1	16.7	20.5	26.5	36.0	52.0	83.4
4.6	4.8	5.4	6.4	8.0	10.6	14.9	22.2	36.0	66.4
2.1	2.3	2.6	3.3	4.3	6.1	9.1	14.9	26.5	55.1
1.1	1.2	1.4	1.8	2.5	3.8	6.1	10.6	20.5	47.2
0.7	0.7	0.9	1.1	1.6	2.5	4.3	8.0	16.7	41.6
0.4	0.5	0.6	0.8	1.1	1.8	3.3	6.4	14.1	37.7
0.3	0.3	0.4	0.6	0.9	1.4	2.6	5.4	12.4	35.0
0.2	0.3	0.3	0.5	0.7	1.2	2.3	4.8	11.4	33.3
0.2	0.2	0.3	0.4	0.7	1.1	2.1	4.6	11.0	32.5

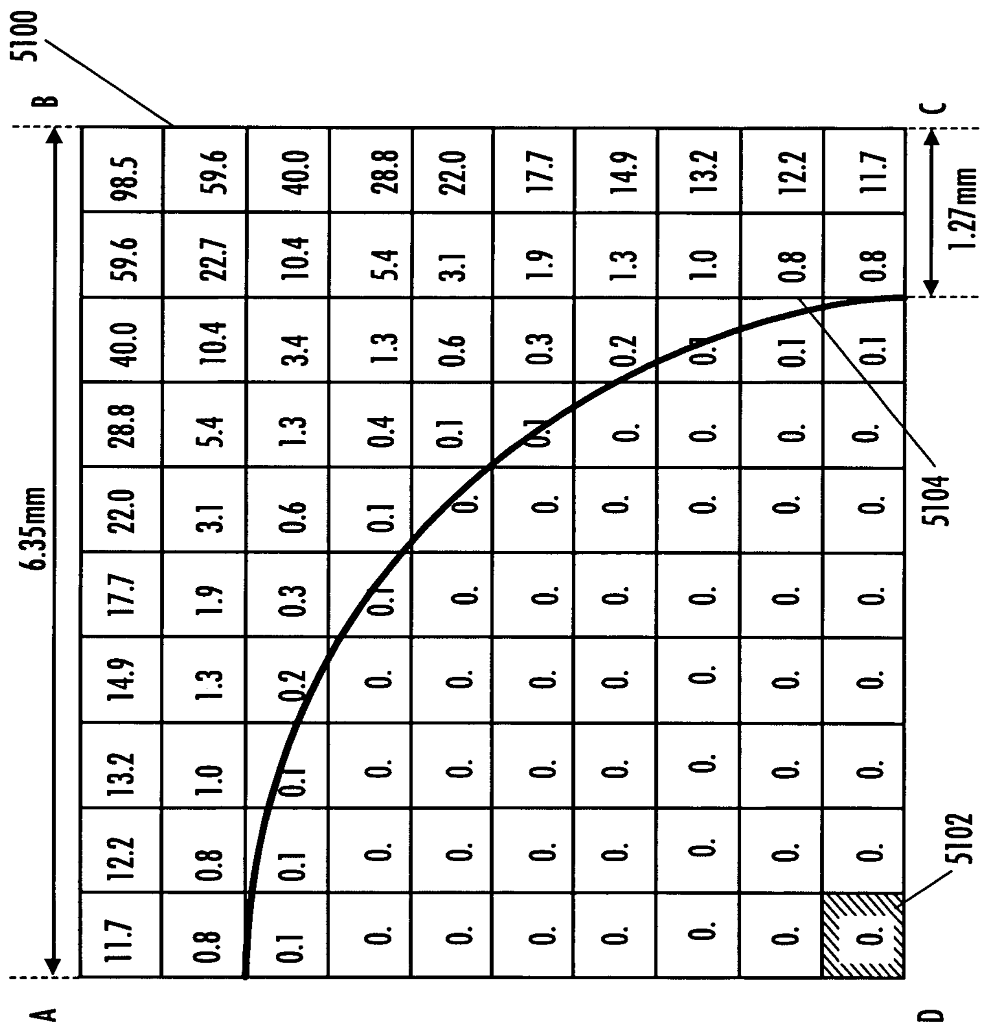
FIG. 49



POLYPROPYLENE
1/2 IN.
TIME = 131.4 s
(HOLDING ONLY)
$\alpha = 6.10 \times 10^{-8} m^2/s$

FIG. 50

POLYPROPYLENE
1/2 IN.



11.7	12.2	13.2	14.9	17.7	22.0	28.8	40.0	59.6	98.5
0.8	0.8	1.0	1.3	1.9	3.1	5.4	10.4	22.7	59.6
0.1	0.1	0.1	0.2	0.3	0.6	1.3	3.4	10.4	40.0
0.	0.	0.	0.	0.1	0.1	0.4	1.3	5.4	28.8
0.	0.	0.	0.	0.	0.	0.1	0.6	3.1	22.0
0.	0.	0.	0.	0.	0.	0.1	0.3	1.9	17.7
0.	0.	0.	0.	0.	0.	0.	0.2	1.3	14.9
0.	0.	0.	0.	0.	0.	0.	0.1	1.0	13.2
0.	0.	0.	0.	0.	0.	0.	0.1	0.8	12.2
0.	0.	0.	0.	0.	0.	0.	0.1	0.8	11.7

FIG. 57

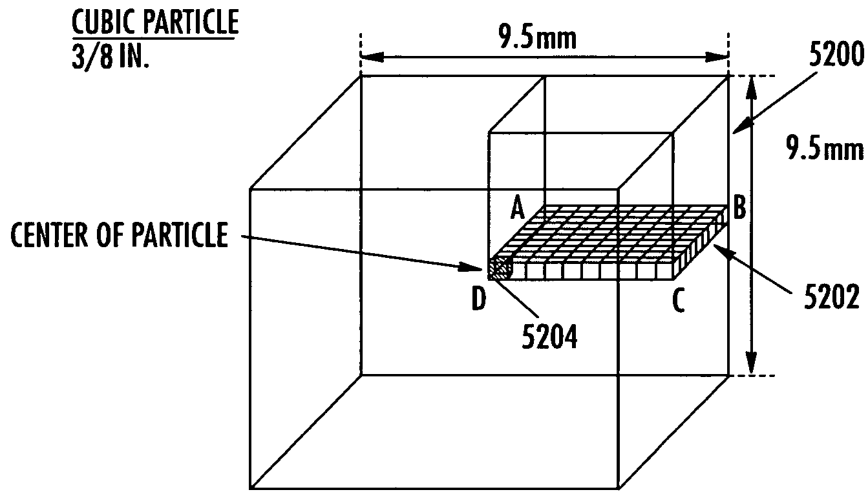
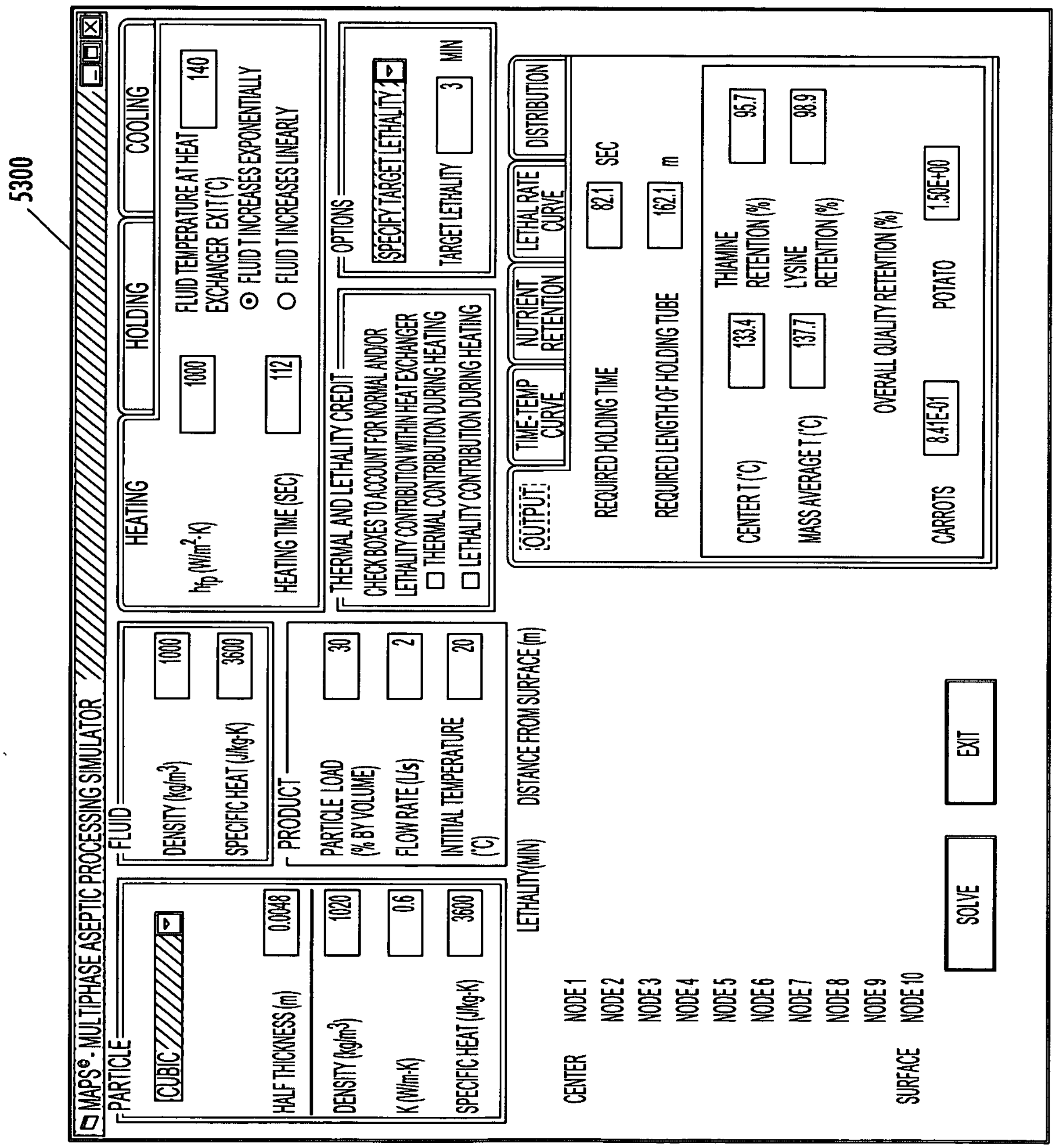

CUBIC PARTICLE
3/8 IN.
9.5mm
5200
9.5mm
A
B
CENTER OF PARTICLE
D
C
5202
5204

FIG. 52

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2



POTATO
3/8 IN.
Fo(CENTER) = 3 MIN.
TIME = 82.1 s
(HOLDING ONLY)
$\alpha = 1.63 \times 10^{-7} m^2/s$

FIG. 53

POTATO
3/8 IN.

FIG. 54

A — 4.8mm — B

23.2	23.6	24.4	25.8	27.7	30.3	33.8	38.7	45.7	56.2
14.8	15.1	15.8	16.9	18.6	20.8	24.0	28.5	35.2	45.7
10.2	10.5	11.1	12.0	13.4	15.4	18.2	22.3	28.5	38.7
7.5	7.7	8.2	9.0	10.2	12.0	14.5	18.2	24.0	33.8
5.8	6.0	6.4	7.1	8.1	9.7	12.0	15.4	20.8	30.3
4.6	4.8	5.2	5.8	6.7	8.1	10.2	13.4	18.6	27.7
3.9	4.1	4.4	4.9	5.8	7.1	9.0	12.0	16.9	25.8
3.4	3.6	3.9	4.4	5.2	6.4	8.2	11.1	15.8	24.4
3.1	3.3	3.6	4.1	4.8	6.0	7.7	10.5	15.1	23.6
3.0	3.1	3.4	3.9	4.6	5.8	7.5	10.2	14.8	23.2

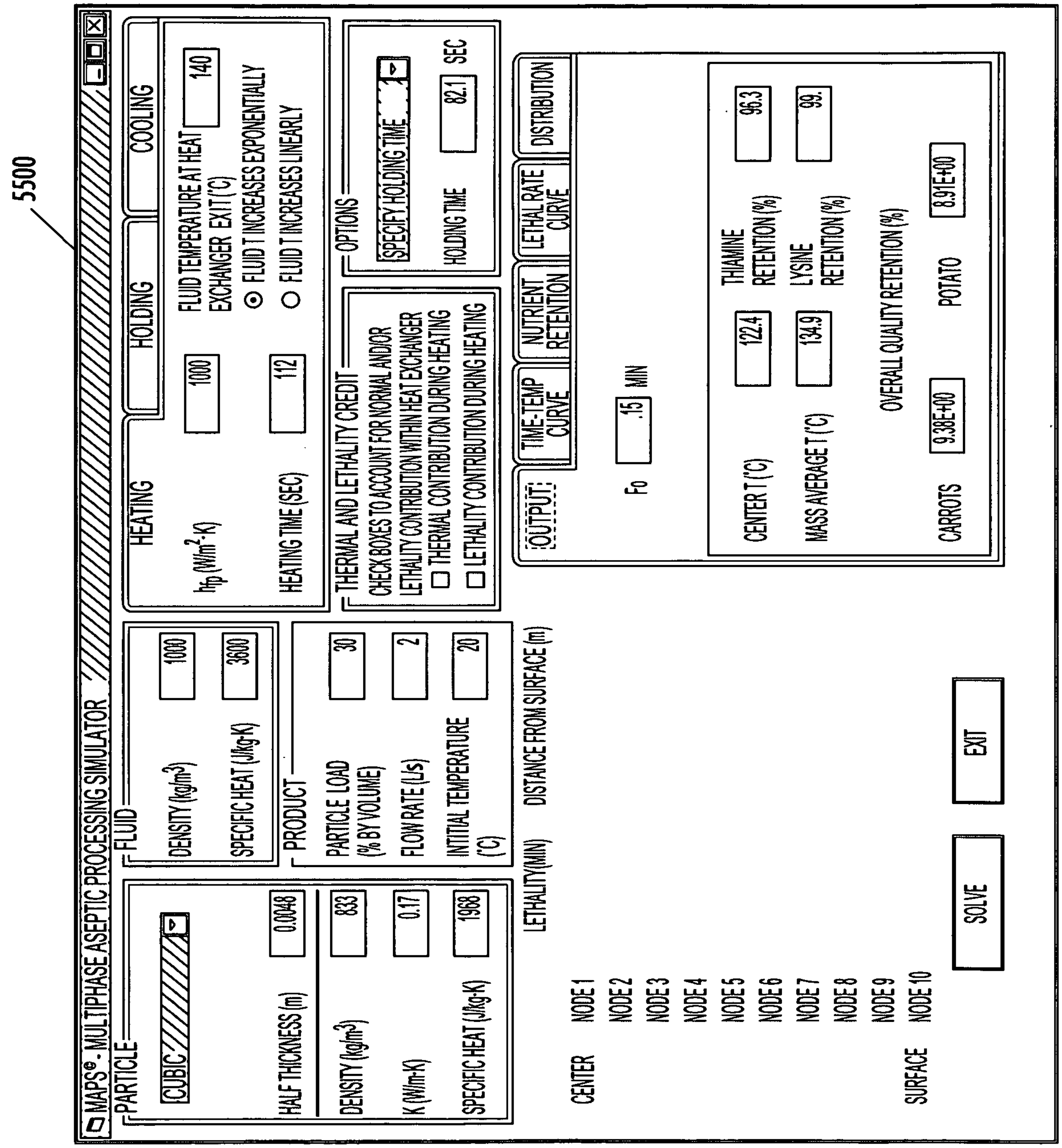
4.8 mm

D C

5400

5402

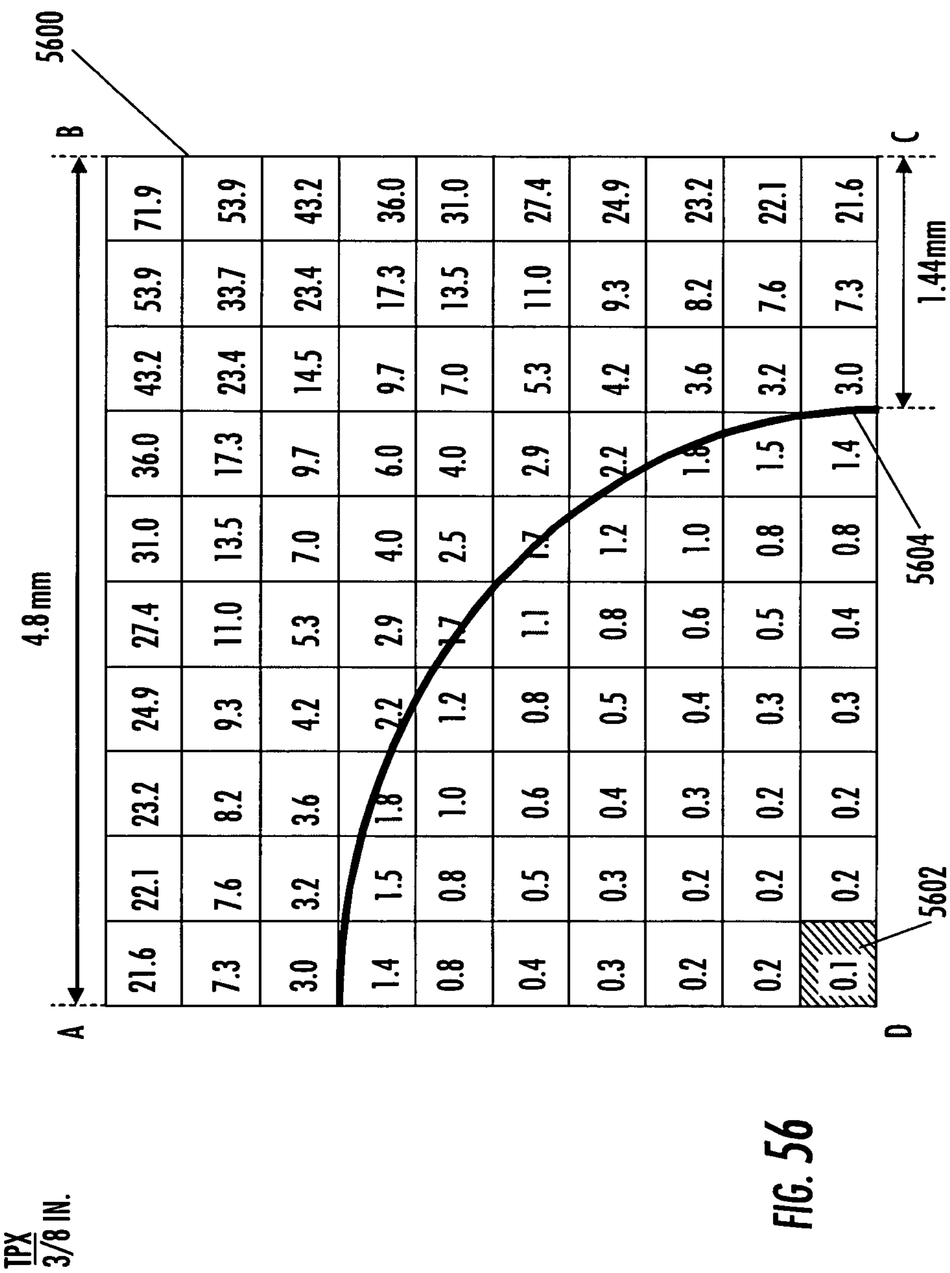
REPLACEMENT DRAWING
Title: Methods, Systems, and Devices
for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2



TPX
3/8 IN.
TIME = 82.1 s
(HOLDING ONLY)
$\alpha = 1.04 \times 10^{-7}\ m^2/s$

FIG. 55

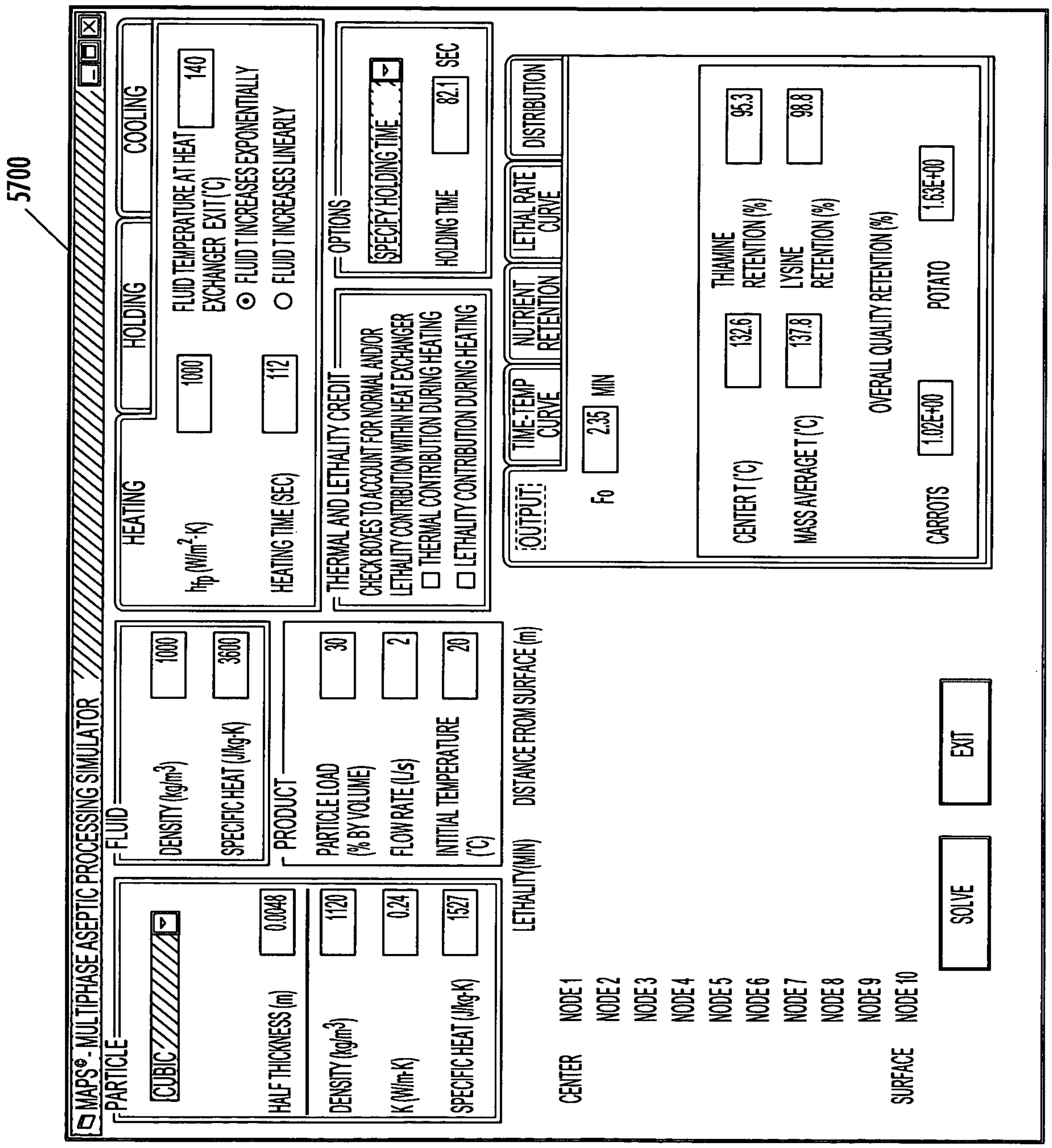
REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2



21.6	22.1	23.2	24.9	27.4	31.0	36.0	43.2	53.9	71.9
7.3	7.6	8.2	9.3	11.0	13.5	17.3	23.4	33.7	53.9
3.0	3.2	3.6	4.2	5.3	7.0	9.7	14.5	23.4	43.2
1.4	1.5	1.8	2.2	2.9	4.0	6.0	9.7	17.3	36.0
0.8	0.8	1.0	1.2	1.7	2.5	4.0	7.0	13.5	31.0
0.4	0.5	0.6	0.8	1.1	1.7	2.9	5.3	11.0	27.4
0.3	0.3	0.4	0.5	0.8	1.2	2.2	4.2	9.3	24.9
0.2	0.2	0.3	0.4	0.6	1.0	1.8	3.6	8.2	23.2
0.2	0.2	0.2	0.3	0.5	0.8	1.5	3.2	7.6	22.1
0.1	0.2	0.2	0.3	0.4	0.8	1.4	3.0	7.3	21.6

FIG. 56

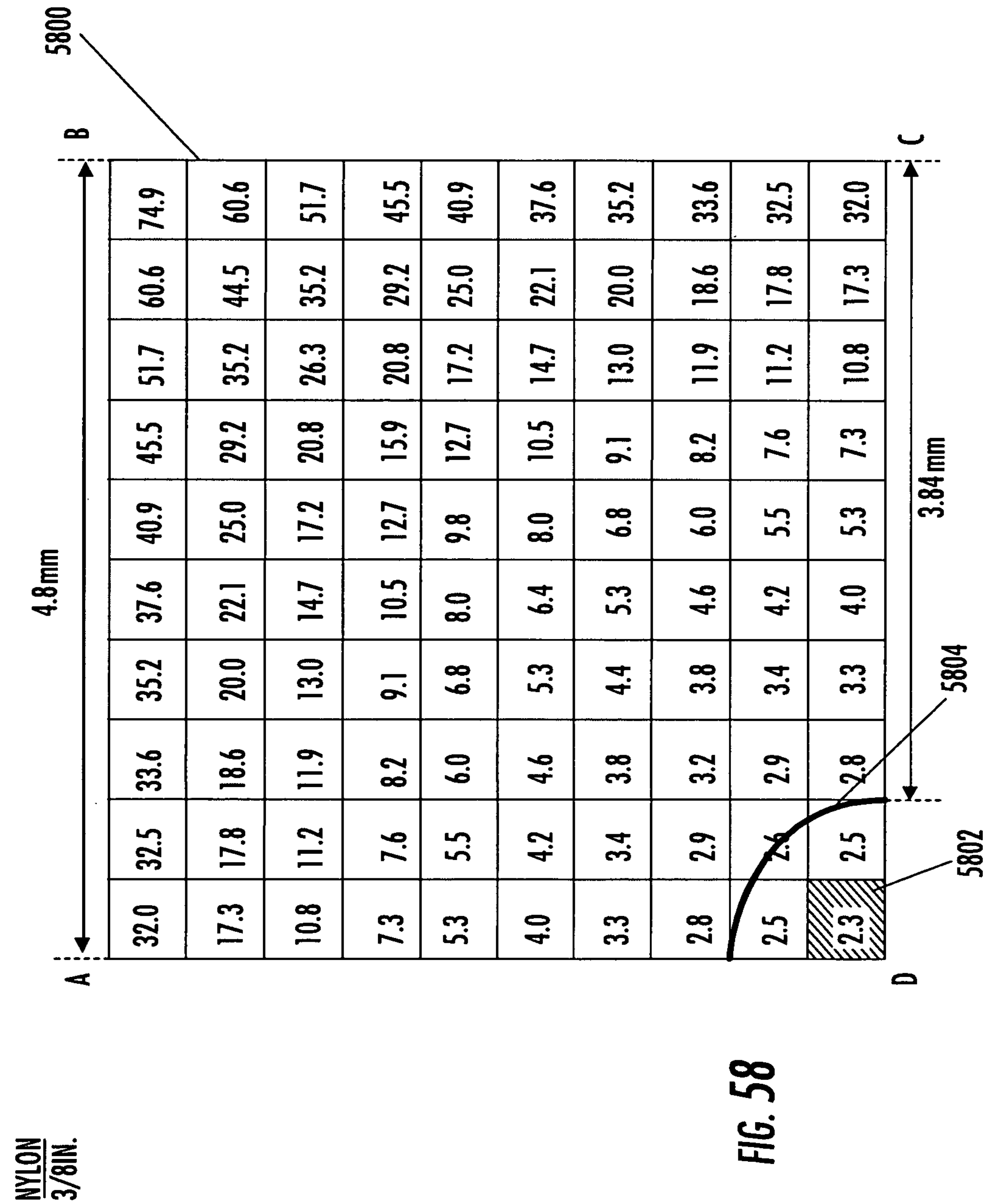
REPLACEMENT DRAWING:
Title: Methods, Systems, and Devices
for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2



NYLON
3/8 IN.
TIME = 82.1 s
(HOLDING ONLY)
$\alpha = 1.40 \times 10^{-7}\ m^2/s$

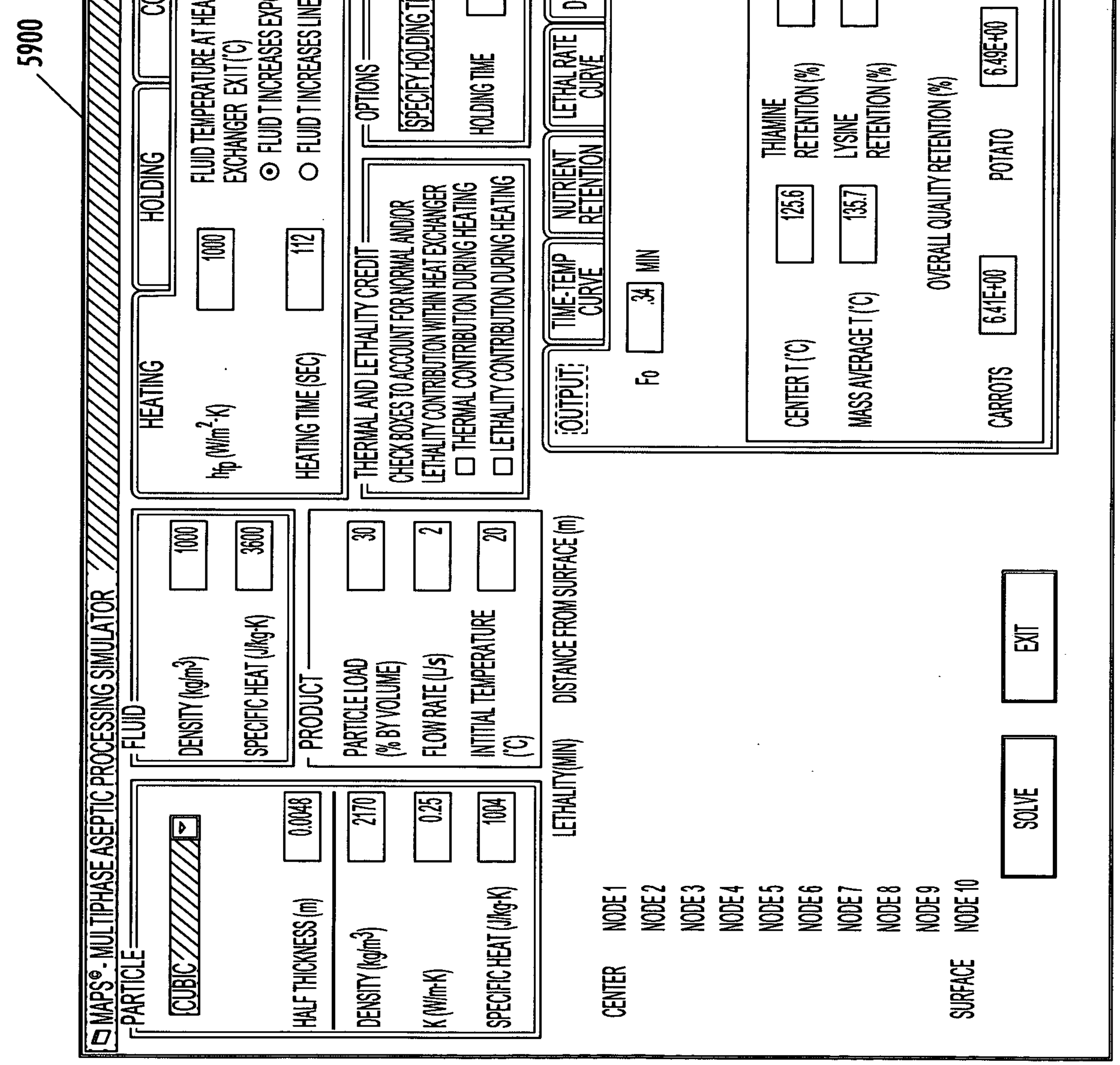
FIG. 57

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2



32.0	32.5	33.6	35.2	37.6	40.9	45.5	51.7	60.6	74.9
17.3	17.8	18.6	20.0	22.1	25.0	29.2	35.2	44.5	60.6
10.8	11.2	11.9	13.0	14.7	17.2	20.8	26.3	35.2	51.7
7.3	7.6	8.2	9.1	10.5	12.7	15.9	20.8	29.2	45.5
5.3	5.5	6.0	6.8	8.0	9.8	12.7	17.2	25.0	40.9
4.0	4.2	4.6	5.3	6.4	8.0	10.5	14.7	22.1	37.6
3.3	3.4	3.8	4.4	5.3	6.8	9.1	13.0	20.0	35.2
2.8	2.9	3.2	3.8	4.6	6.0	8.2	11.9	18.6	33.6
2.5	2.6	2.9	3.4	4.2	5.5	7.6	11.2	17.8	32.5
2.3	2.5	2.8	3.3	4.0	5.3	7.3	10.8	17.3	32.0

FIG. 58



TEFLON
3/8 IN.
TIME = 82.1 s
(HOLDING ONLY)
$\alpha = 1.15 \times 10^{-7} m^2/s$

FIG. 59

TEFLON
3/8 IN.

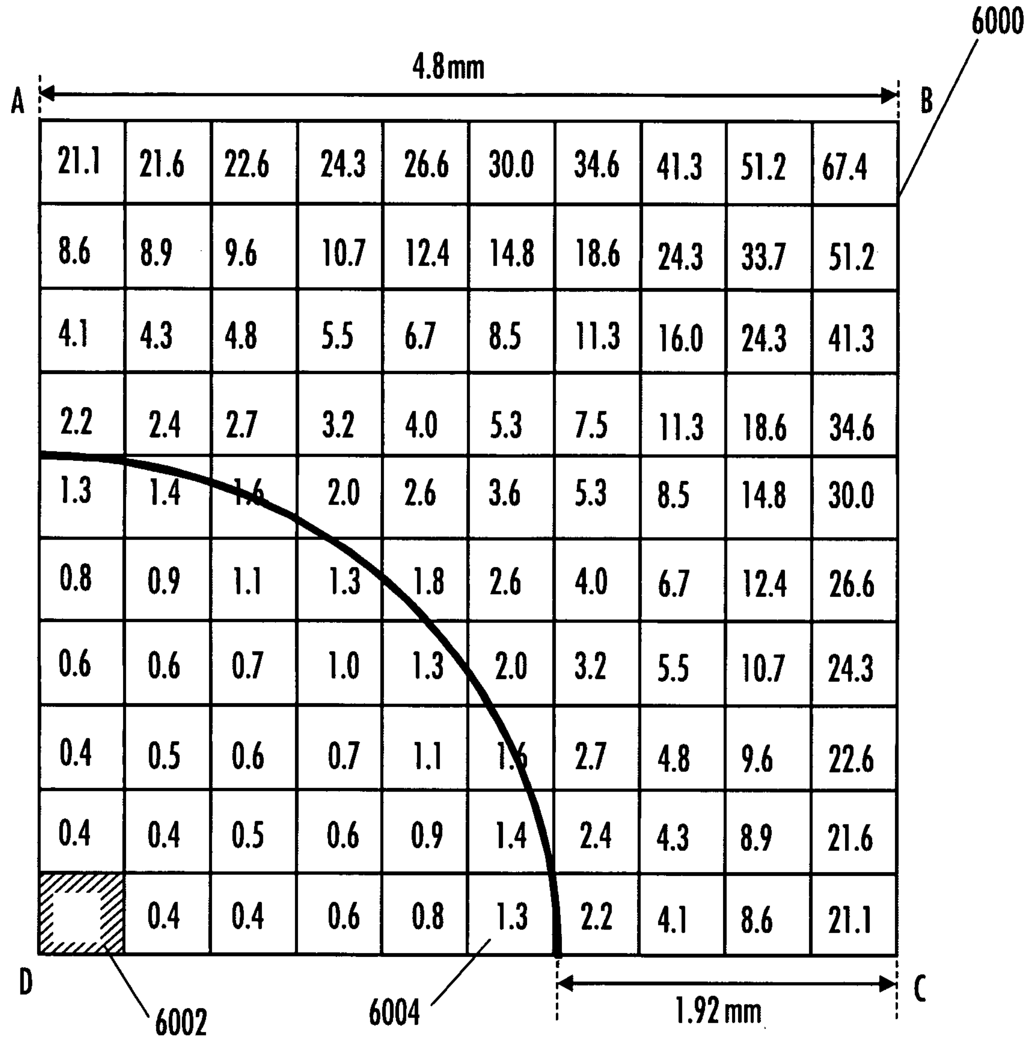


FIG. 60

POLYPROPYLENE
3/8 IN.
TIME = 82.1
(HOLDING ONLY)
$\alpha = 6.10 \times 10^{-8} m^2/s$

6100

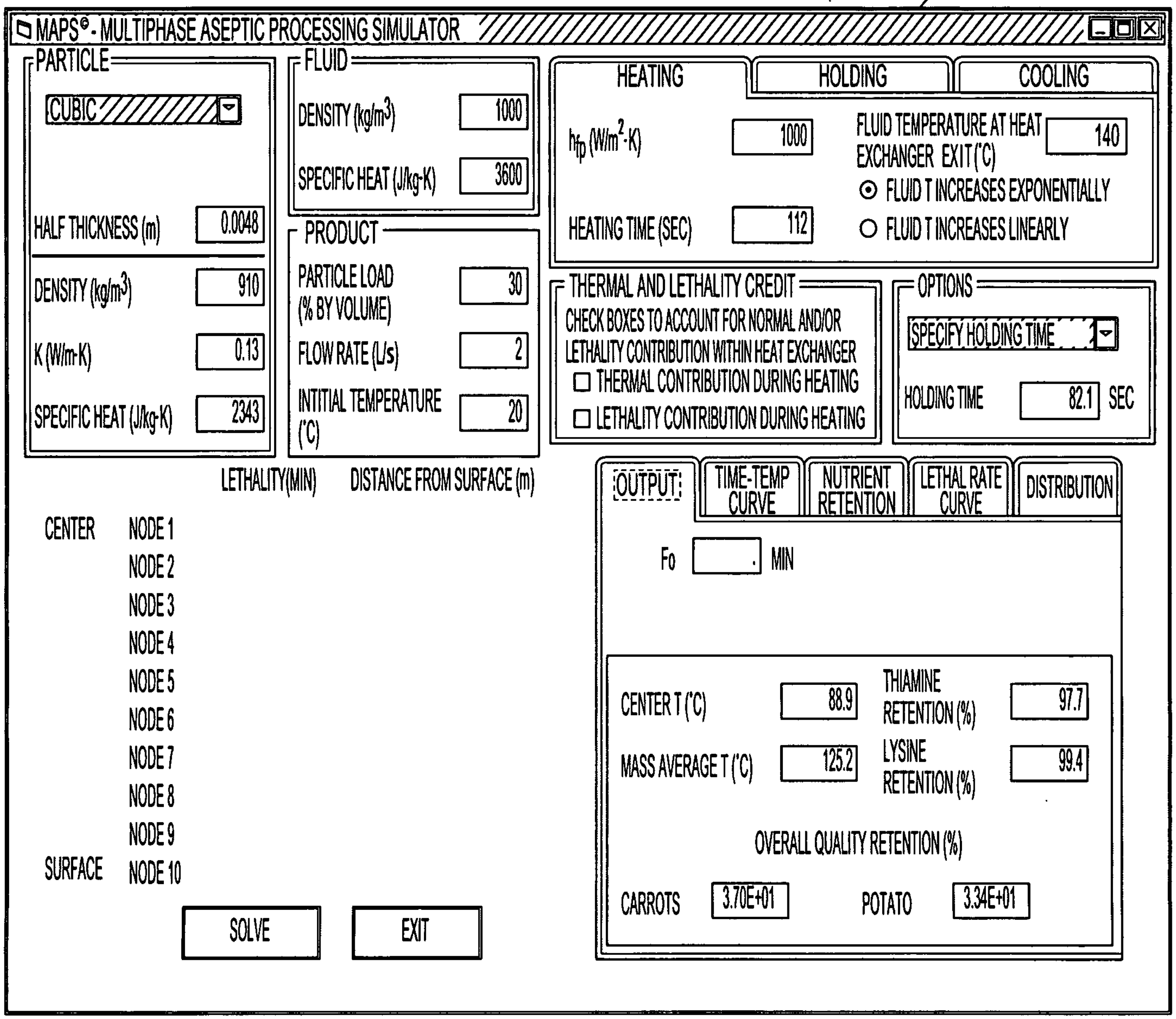
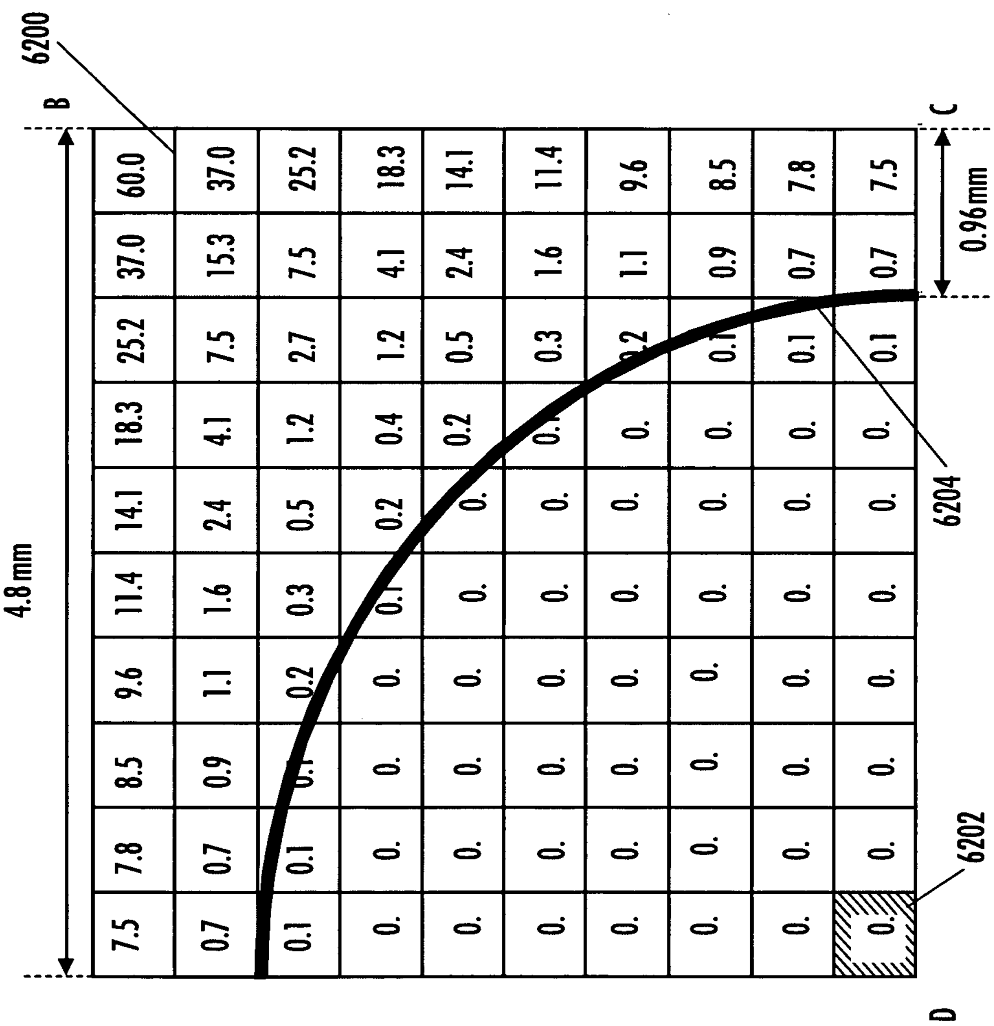


FIG. 61



POLYPROPYLENE
3/8 IN.

FIG. 62

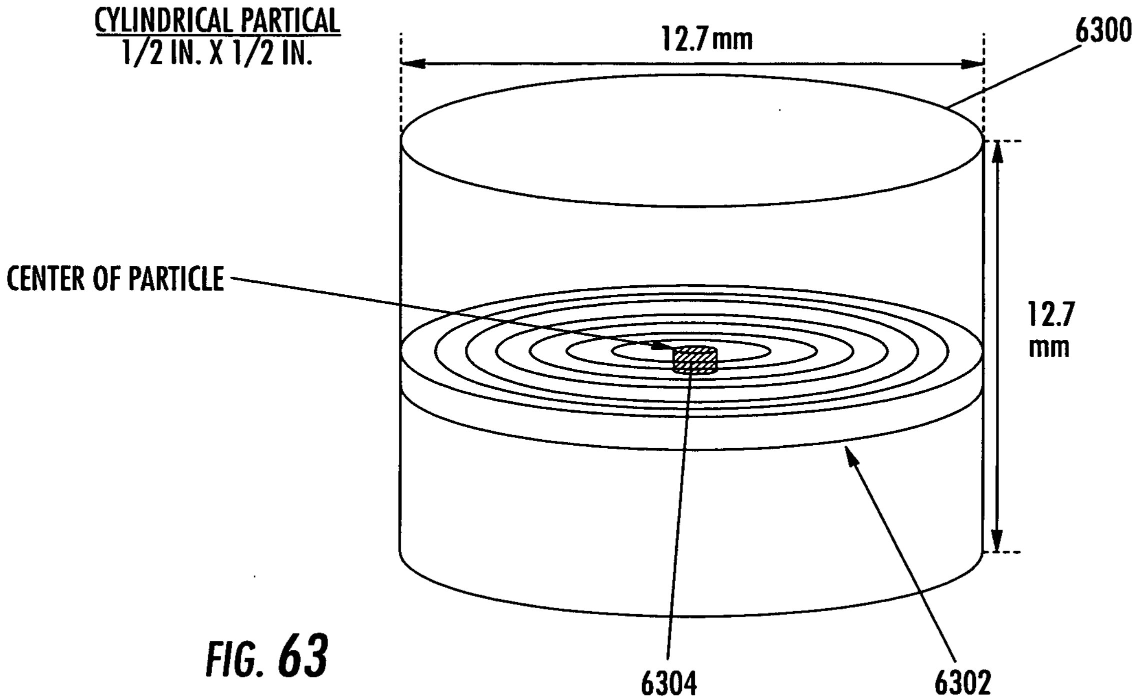
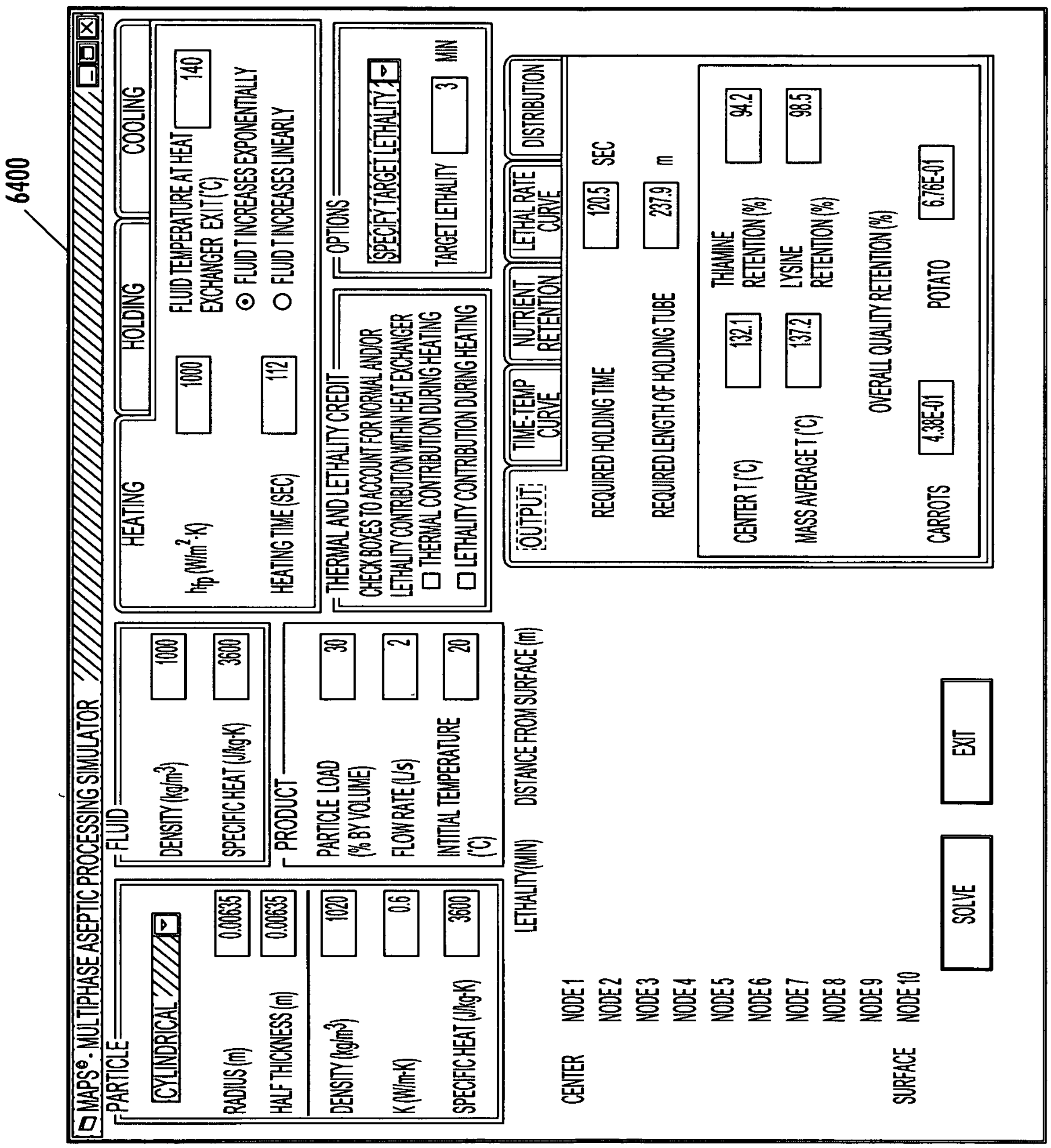

CYLINDRICAL PARTICAL
1/2 IN. X 1/2 IN.
12.7mm
6300
CENTER OF PARTICLE
12.7
mm
6304
6302

FIG. 63



POTATO
1/2 IN. X 1/2 IN.
F_0(CENTER) = 3 MIN.
TIME = 120.5 s
(HOLDING ONLY)
$\alpha = 1.63 \times 10^{-7}\ m^2/s$

FIG. 64

POTATO
1/2 IN. X 1/2 IN.

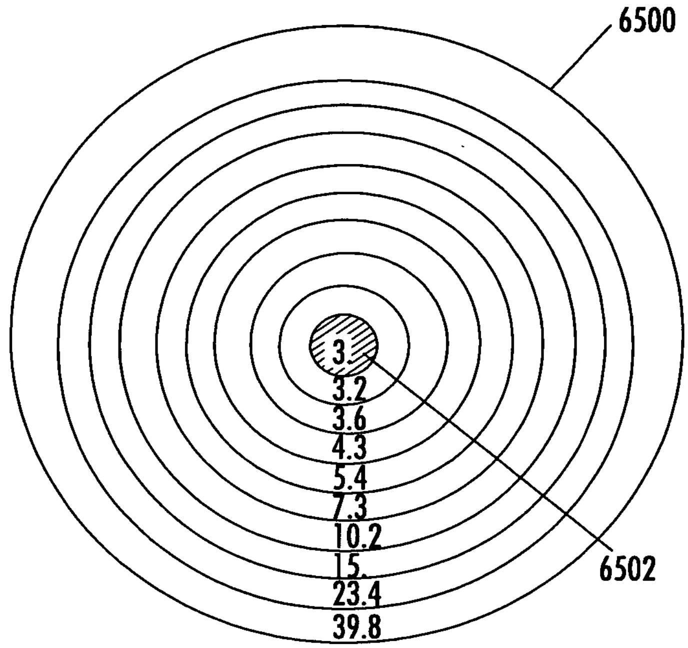
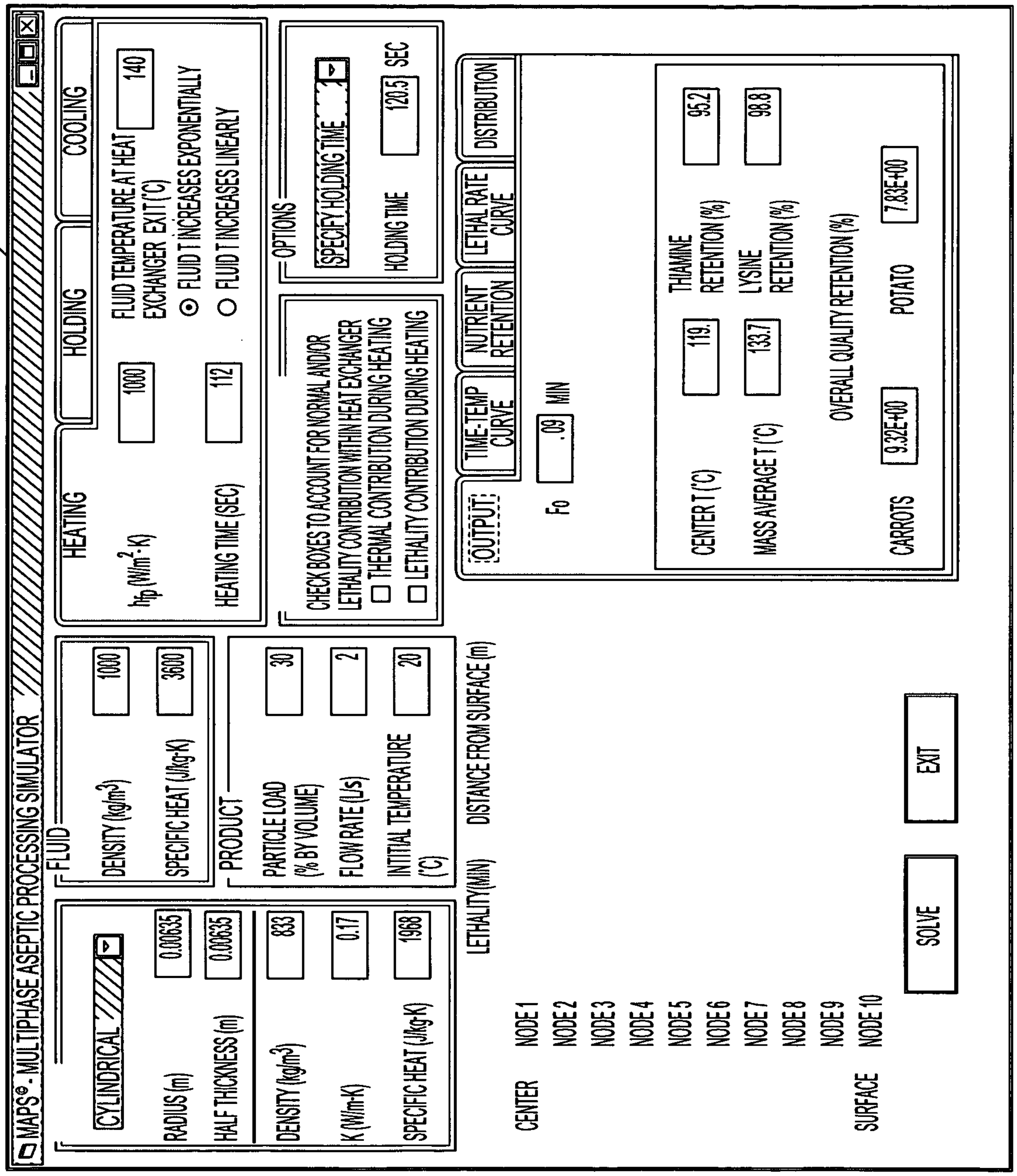


FIG. 65

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

6600



TPX
1/2 IN. X 1/2 IN.
TIME = 120.5 s
(HOLDING ONLY)
$\alpha = 1.04 \times 10^{-7} m^2/s$

FIG. 66

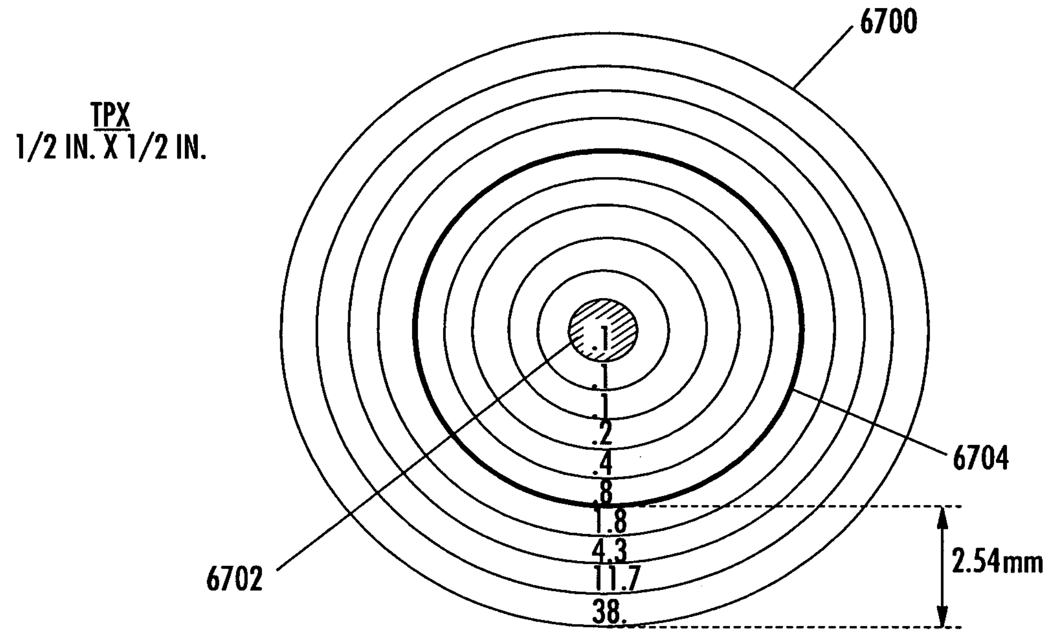
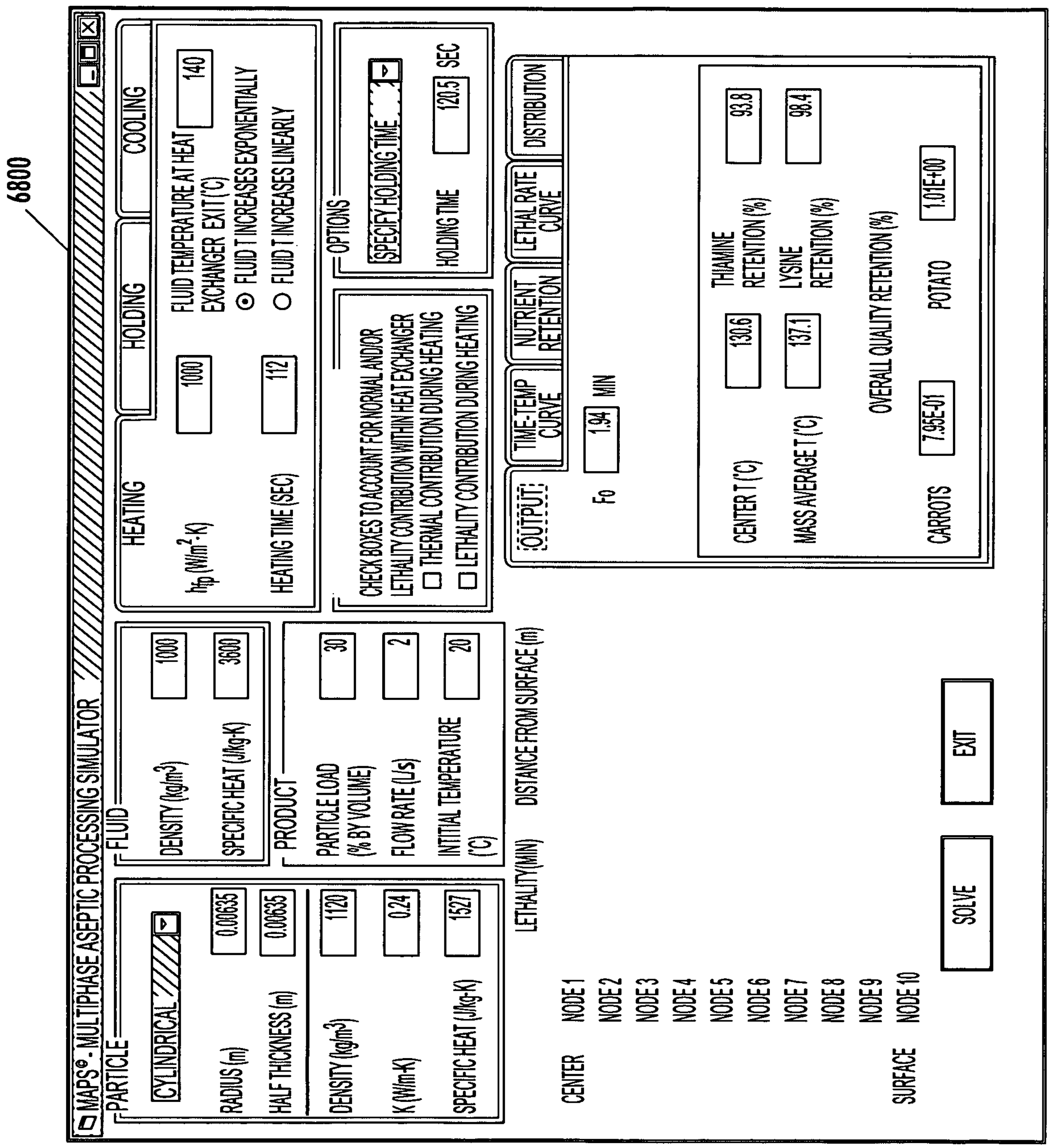


FIG. 67



NYLON
1/2 IN. X 1/2 IN.
TIME = 120.5 s
(HOLDING ONLY)
$\alpha = 1.40 \times 10^{-7} m^2/s$

FIG. 68

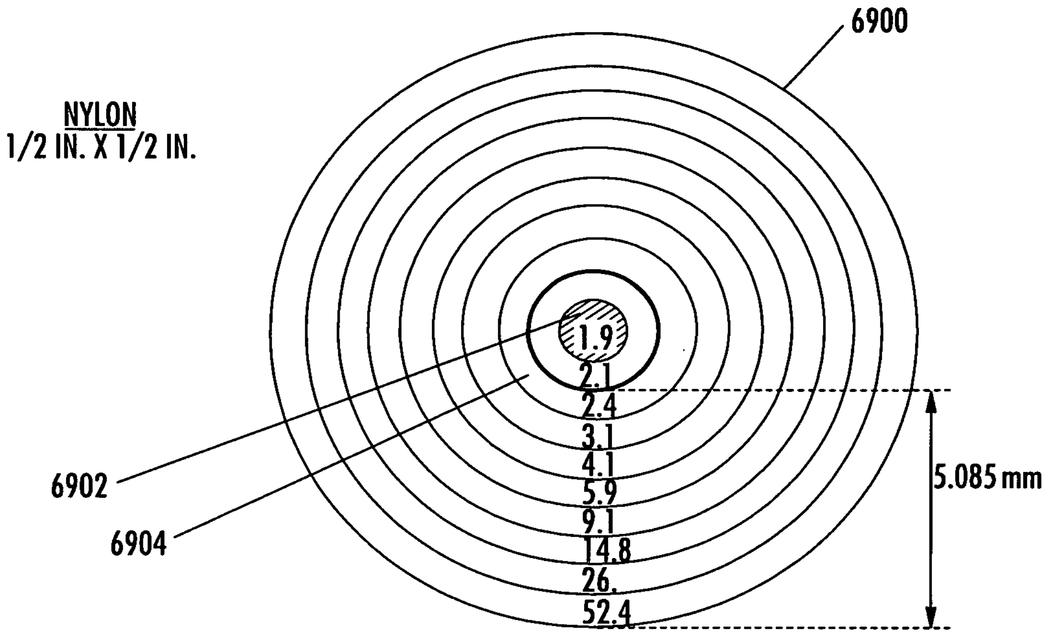

6900
NYLON
1/2 IN. X 1/2 IN.
1.9
2.1
2.4
3.1
4.1
5.9
9.1
14.8
26.
52.4
5.085 mm
6902
6904

FIG. 69

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

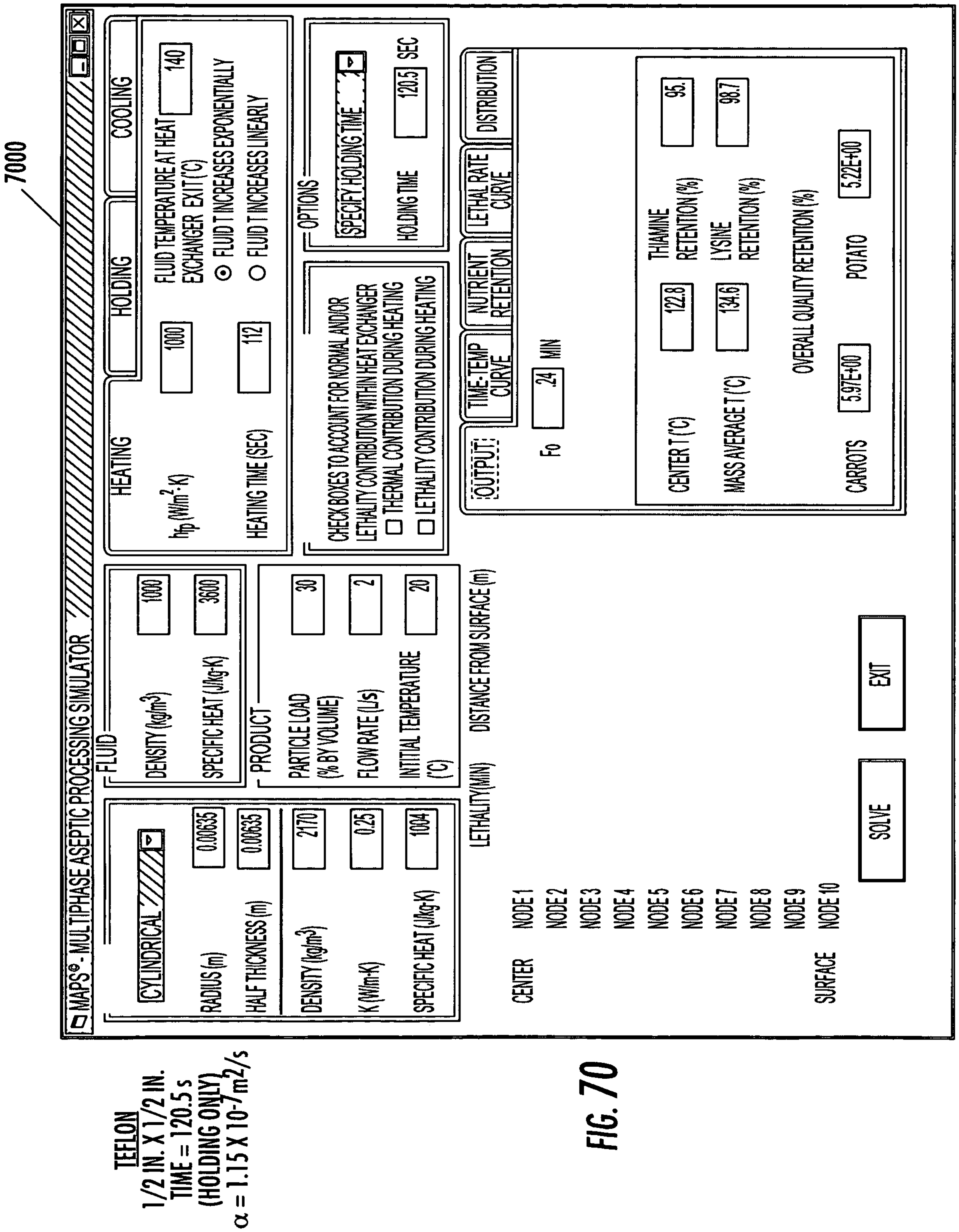


FIG. 70

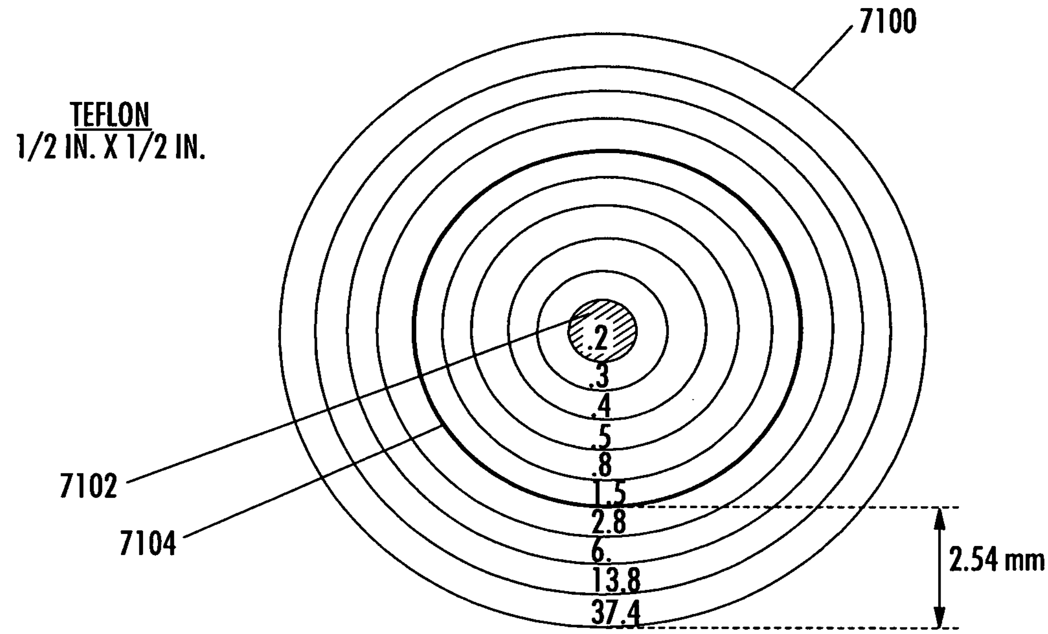
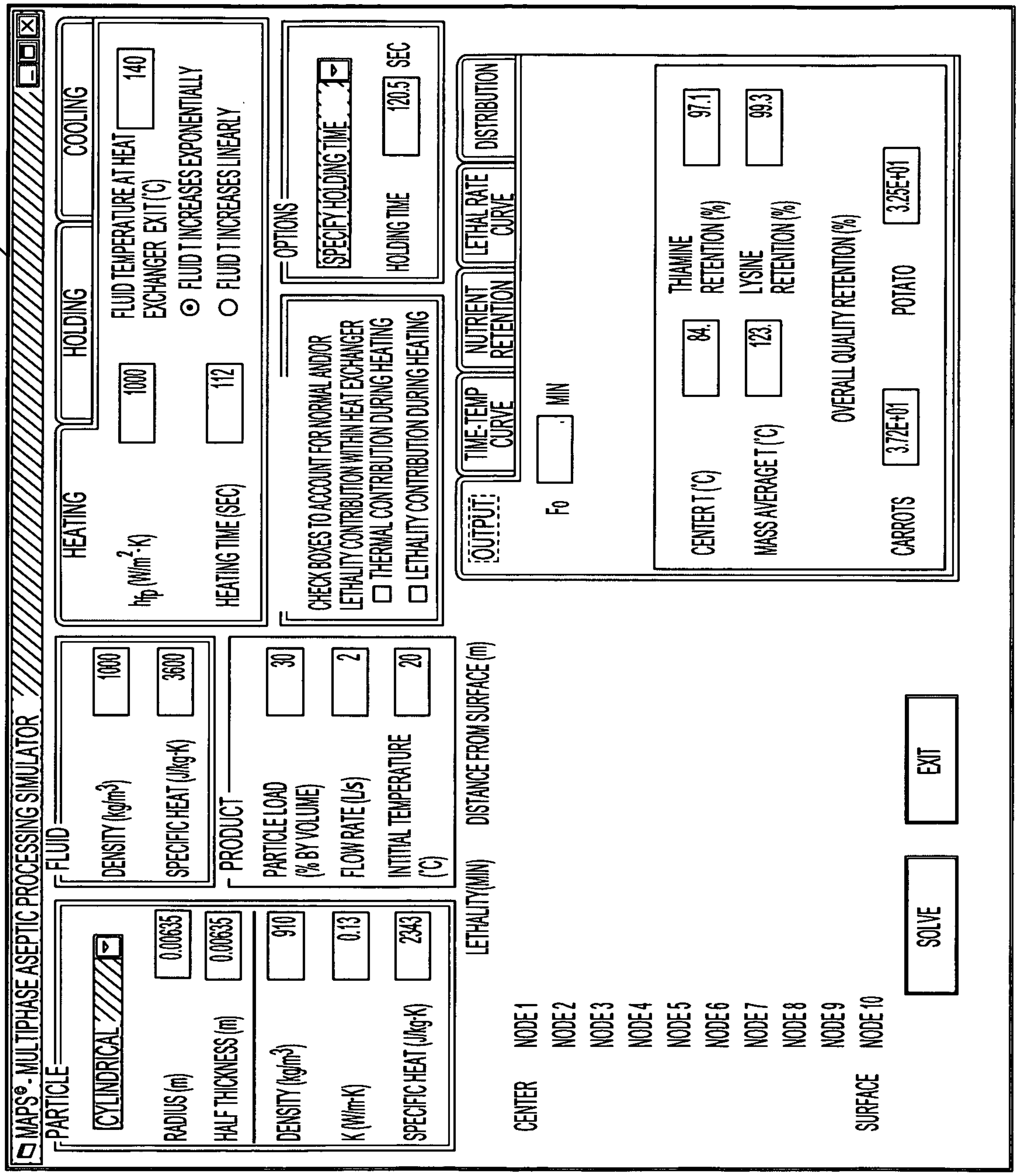


FIG. 71

7200



POLYPROPYLENE
1/2 IN. X 1/2 IN.
TIME = 120.5 s
(HOLDING ONLY)
$\alpha = 6.10 \times 10^{-8} m^2/s$

FIG. 72

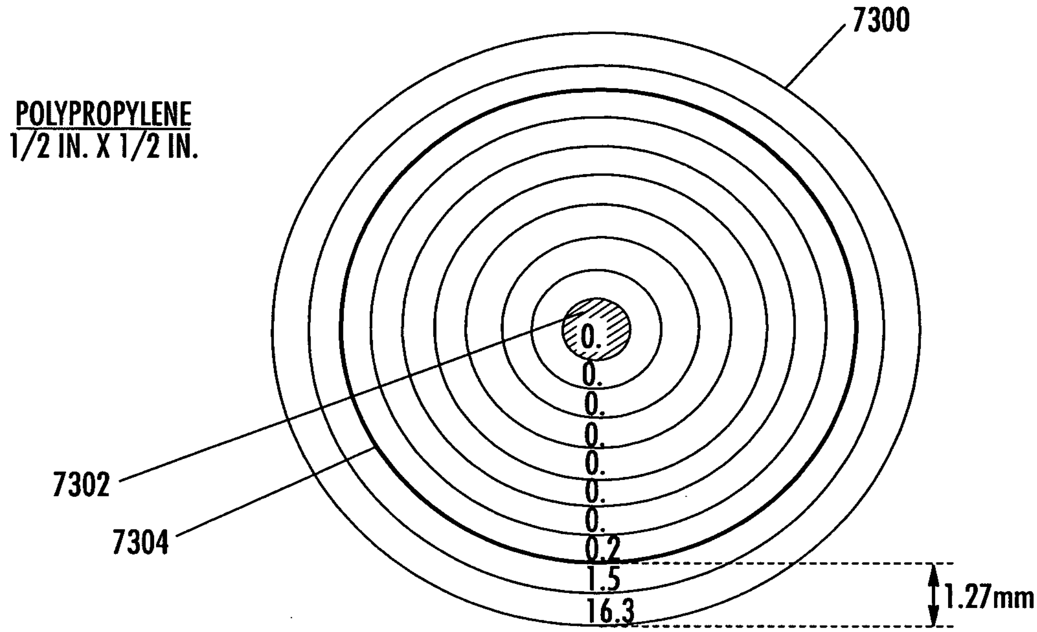

7300
POLYPROPYLENE
1/2 IN. X 1/2 IN.
0.
0.
0.
0.
0.
0.
0.
0.2
1.5
16.3
1.27mm
7302
7304

FIG. 73

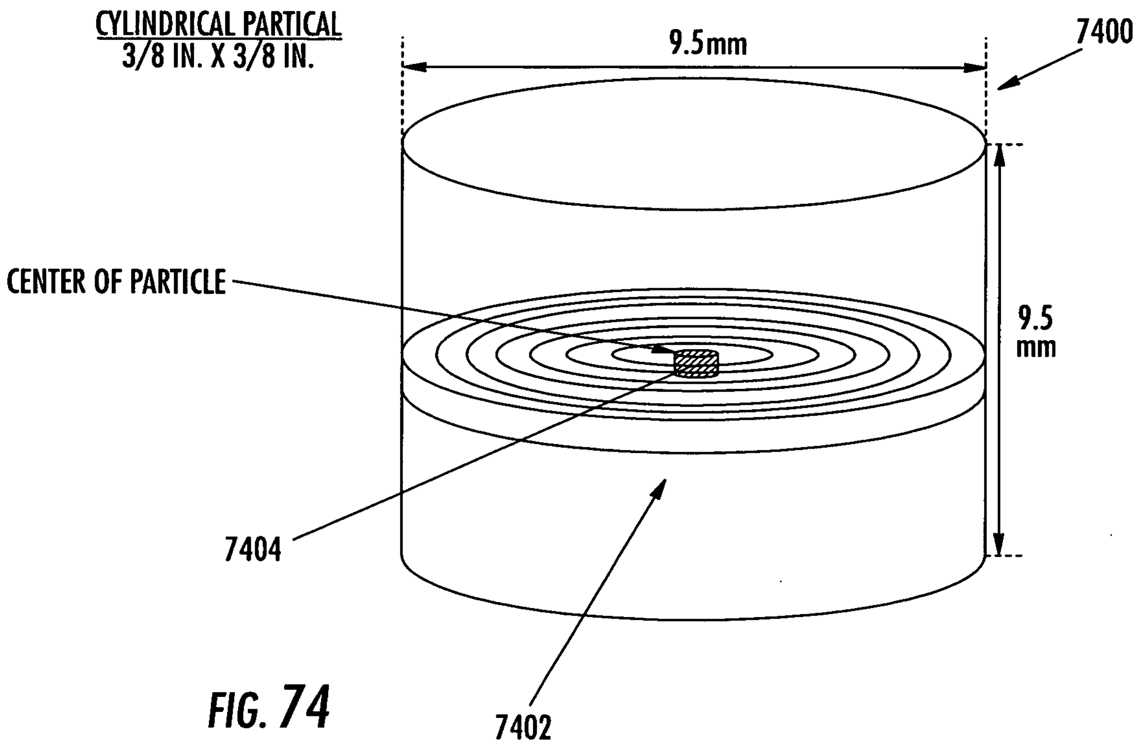
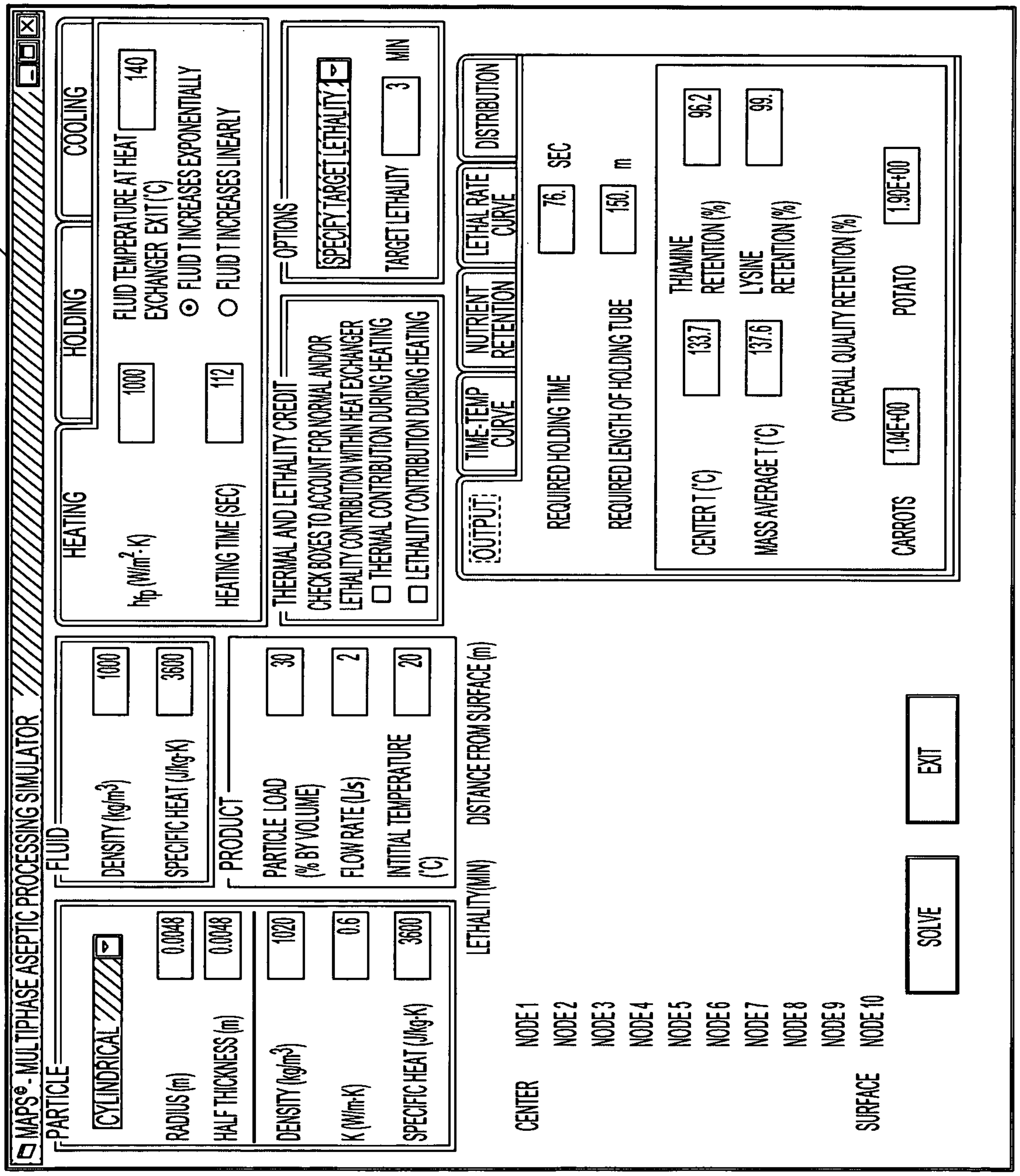

CYLINDRICAL PARTICAL
3/8 IN. X 3/8 IN.
9.5mm
7400
CENTER OF PARTICLE
9.5
mm
7404
7402

FIG. 74

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

7500



POTATO
3/8 IN. X 3/8 IN.
Fo(CENTER) = 3 MIN.
TIME = 76.0 s
(HOLDING ONLY)
$\alpha = 1.63 \times 10^{-7} m^2/s$

FIG. 75

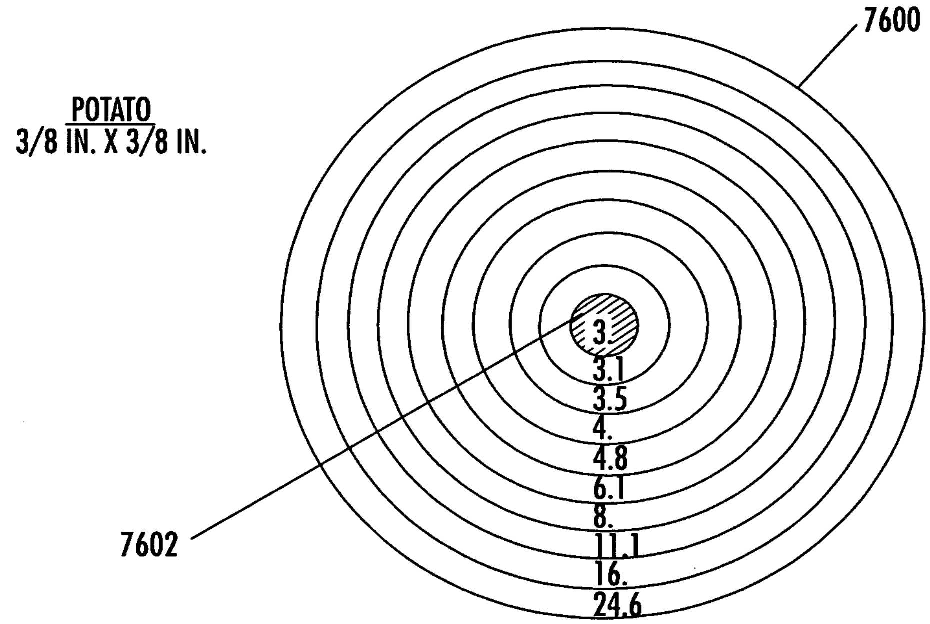
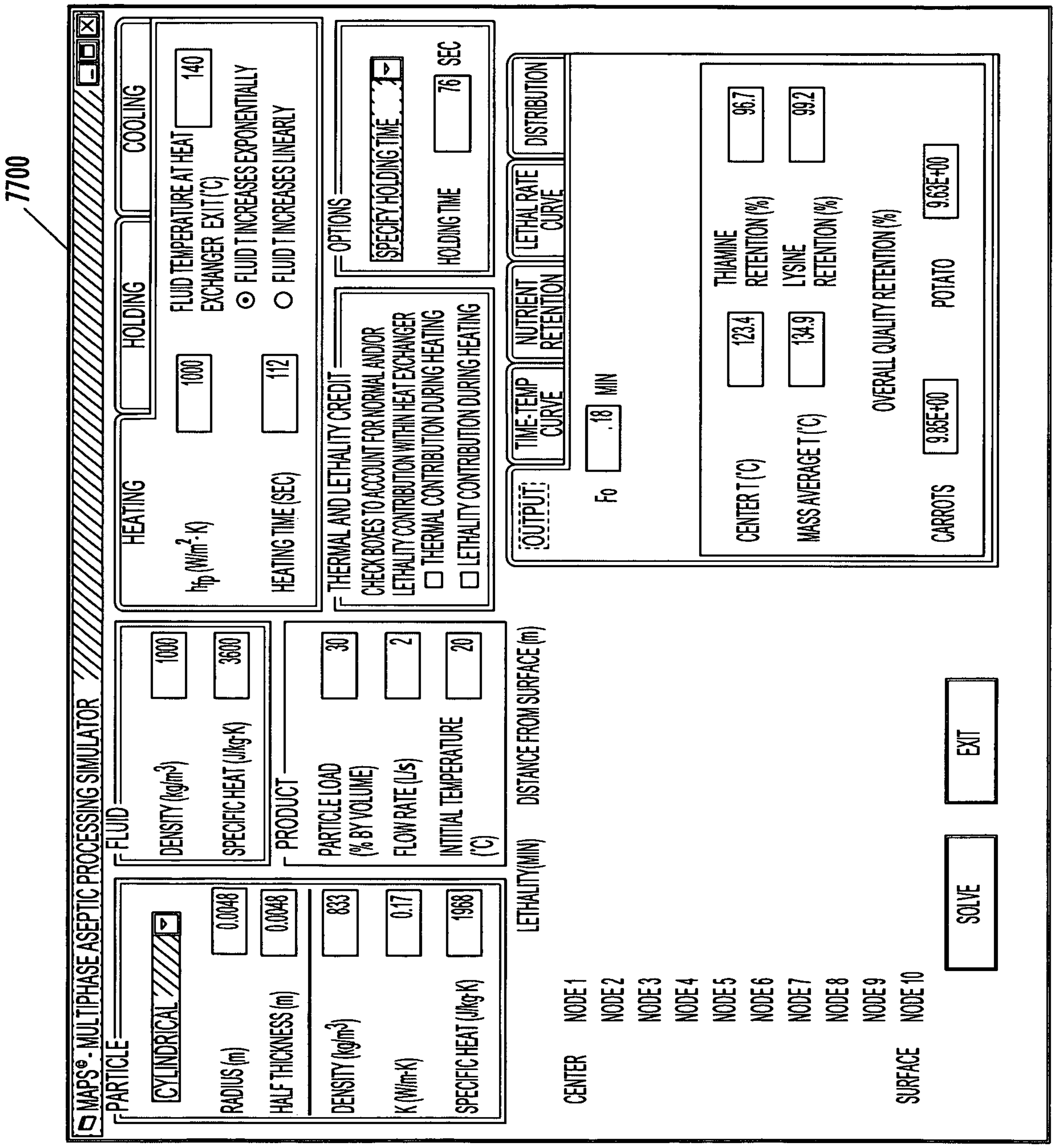


FIG. 76

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2



TPX
3/8 IN. X 3/8 IN.
TIME = 76.0 s
(HOLDING ONLY)
$\alpha = 1.04 \times 10^{-7} m^2/s$

FIG. 77

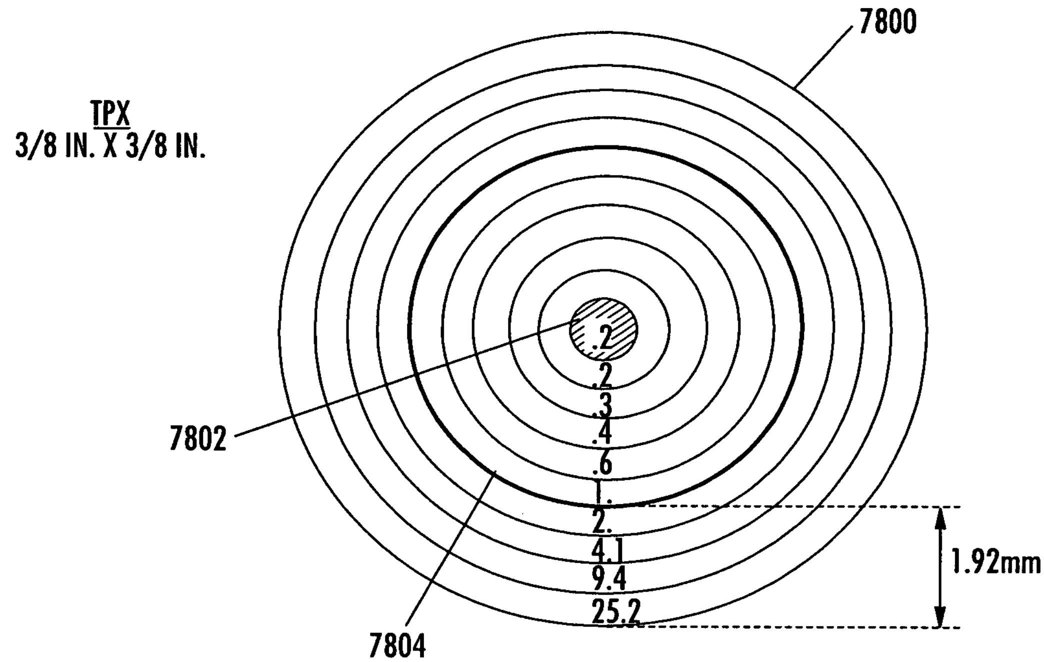
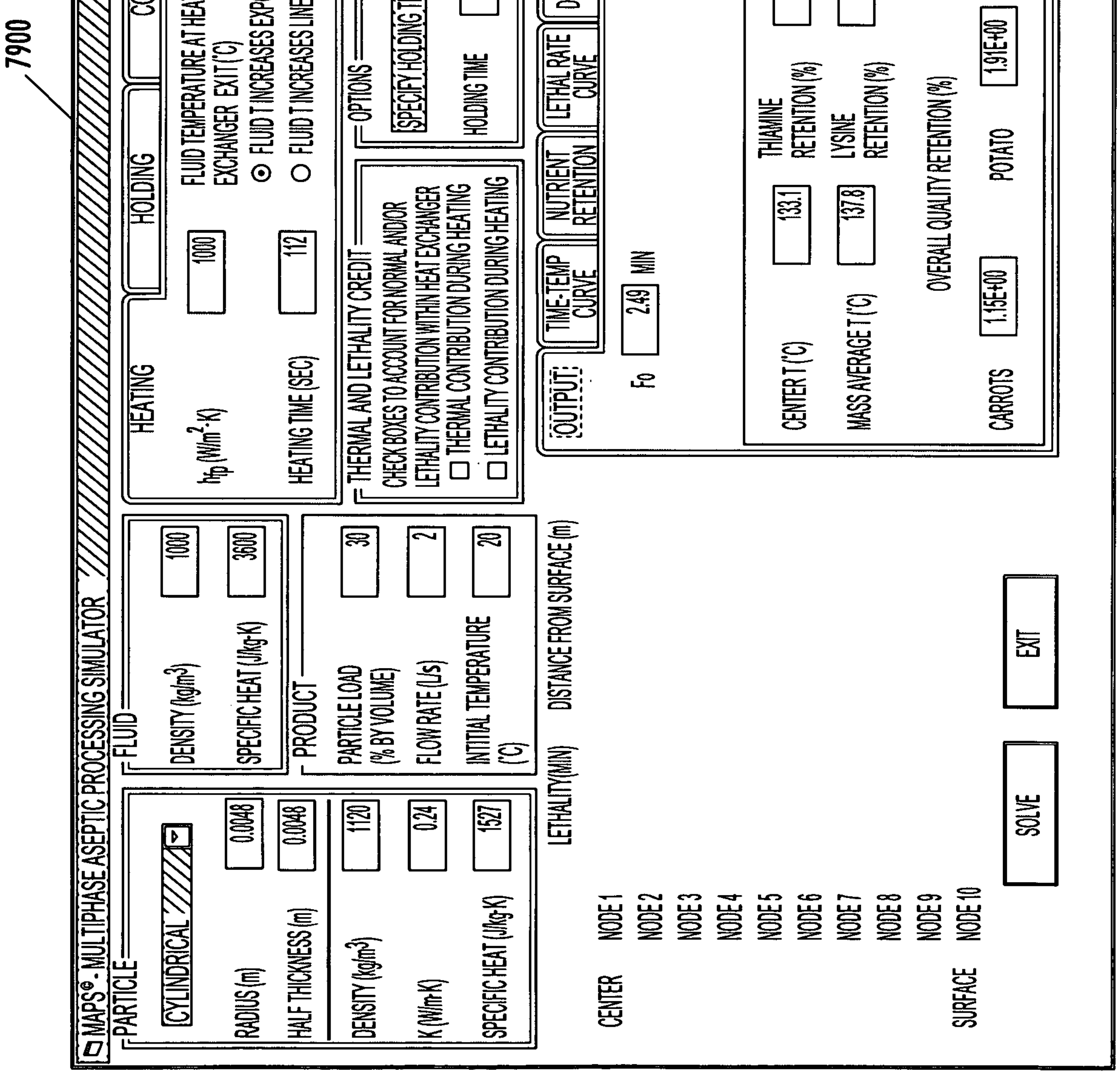


FIG. 78



NYLON
3/8 IN. X 3/8 IN.
TIME = 76.0 s
(HOLDING ONLY)
$\alpha = 1.40 \times 10^{-7}\ m^2/s$

FIG. 79

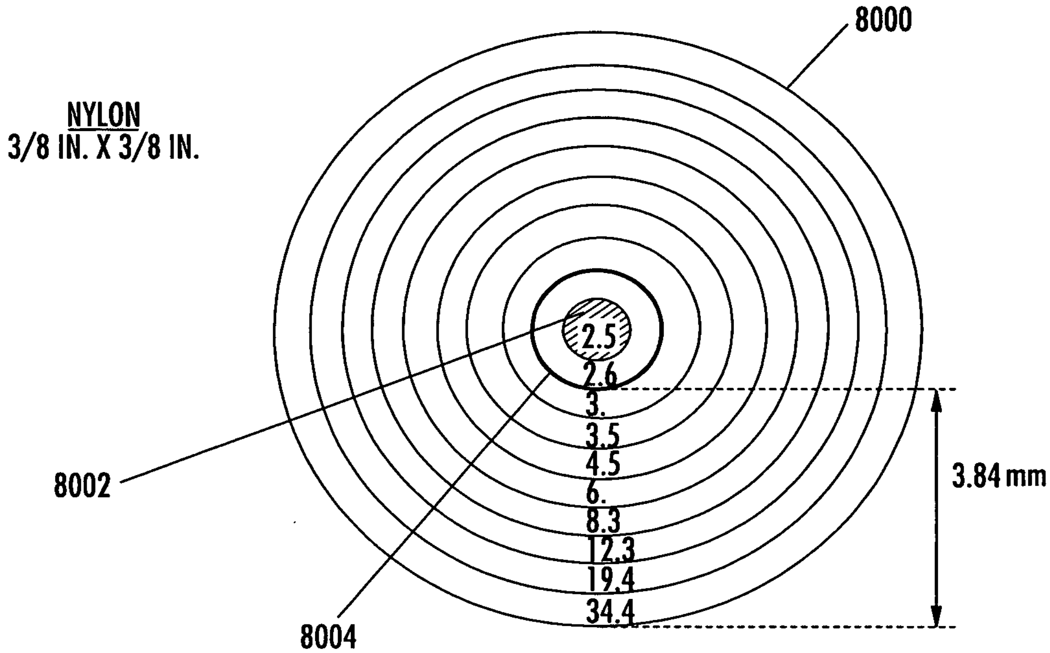
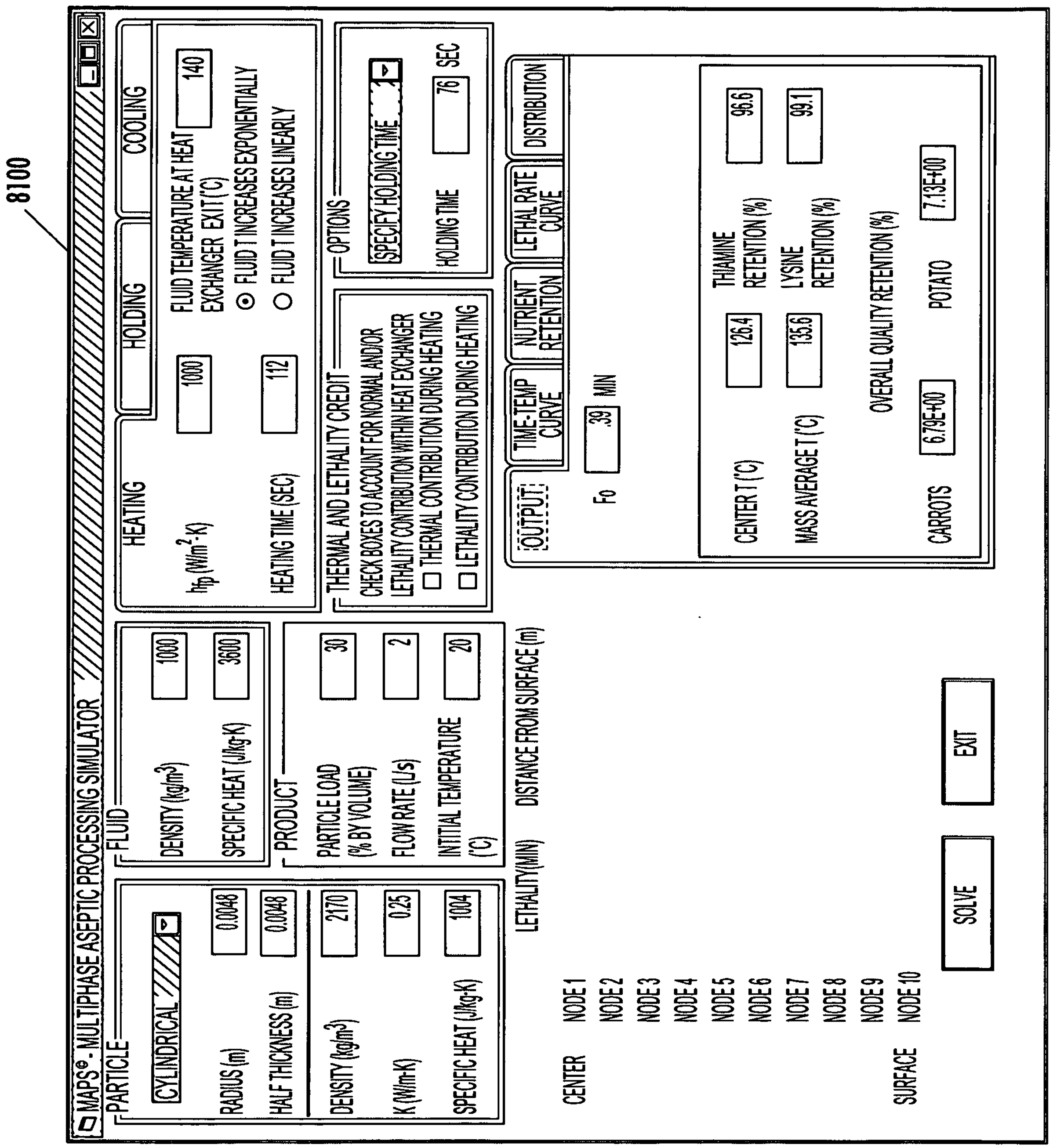

NYLON
3/8 IN. X 3/8 IN.
8000
8002
8004
2.5
2.6
3.
3.5
4.5
6.
8.3
12.3
19.4
34.4
3.84 mm

FIG. 80

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices
for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2



TEFLON
3/8 IN. X 3/8 IN.
TIME = 76.0 s
(HOLDING ONLY)
$\alpha = 1.15 \times 10^{-7} m^2/s$

FIG. 81

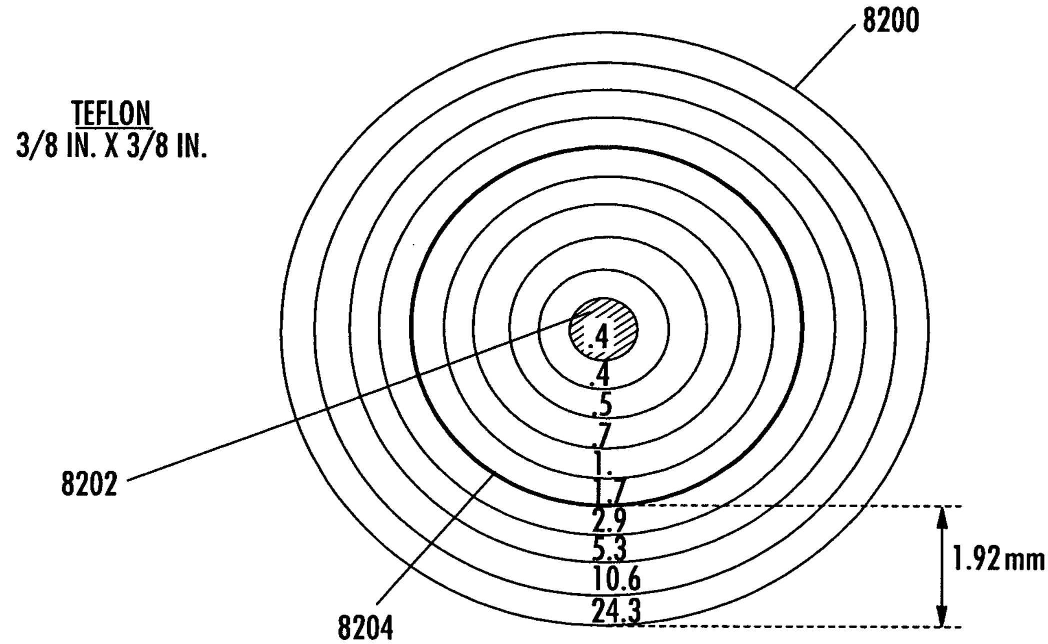
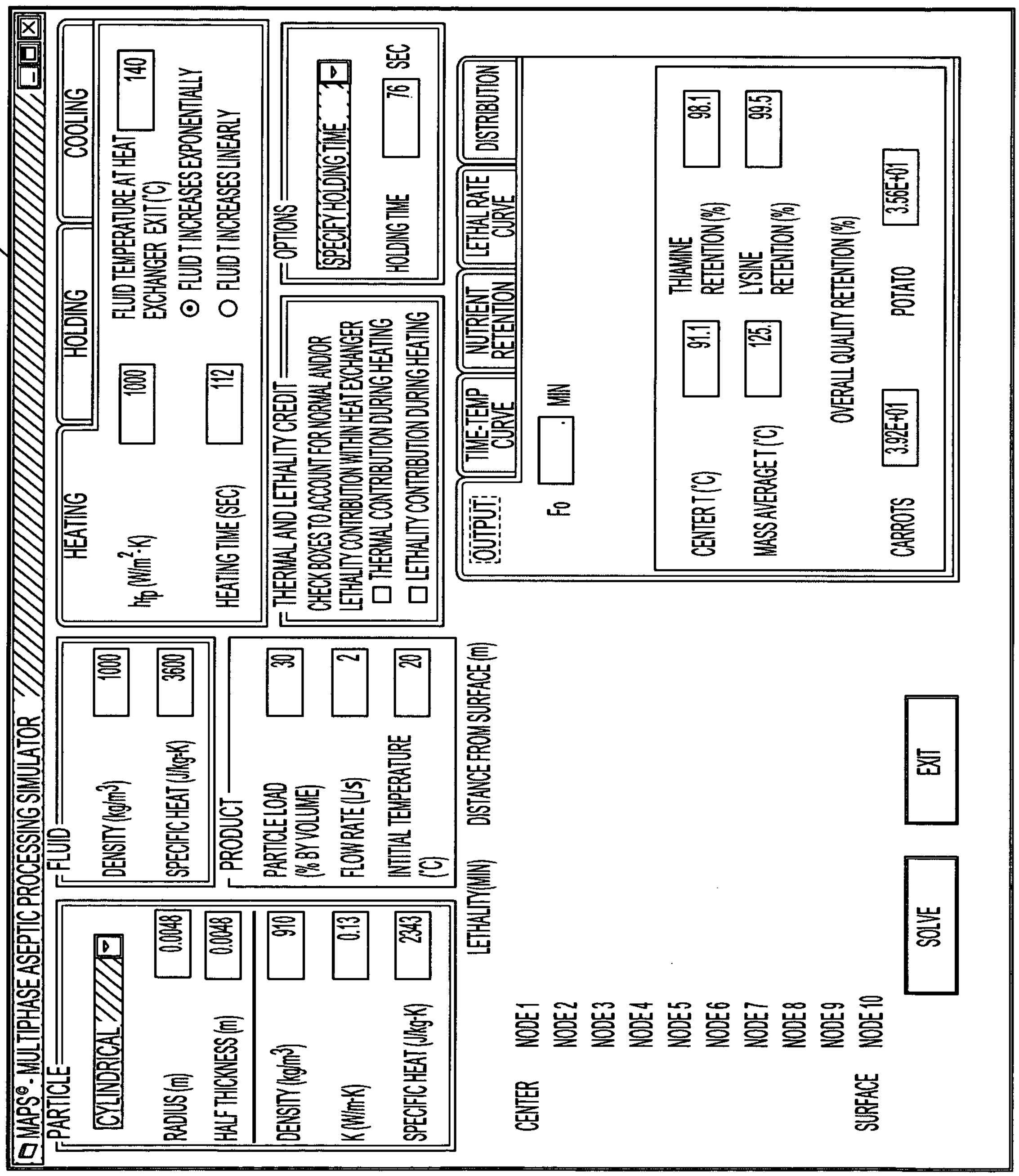


FIG. 82

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2



POLYPROPYLENE
3/8 IN. X 3/8 IN.
TIME = 76.0 s
(HOLDING ONLY)
$\alpha = 6.10 \times 10^{-8} m^2/s$

FIG. 83

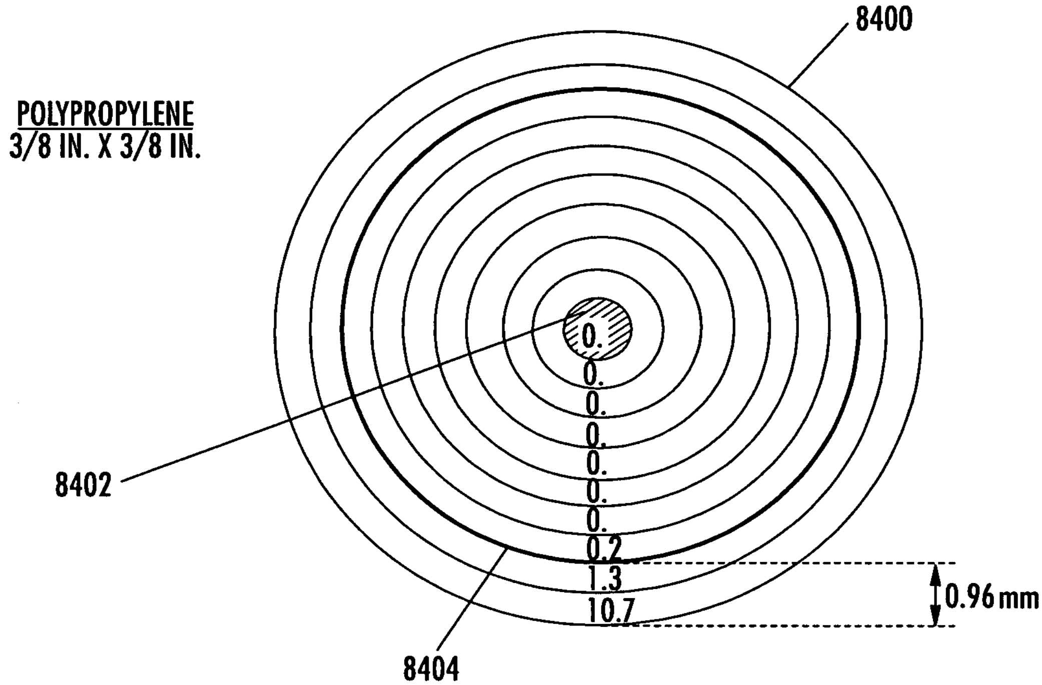

POLYPROPYLENE
3/8 IN. X 3/8 IN.
8400
8402
8404
0.
0.
0.
0.
0.
0.
0.
0.2
1.3
10.7
0.96mm

FIG. **84**

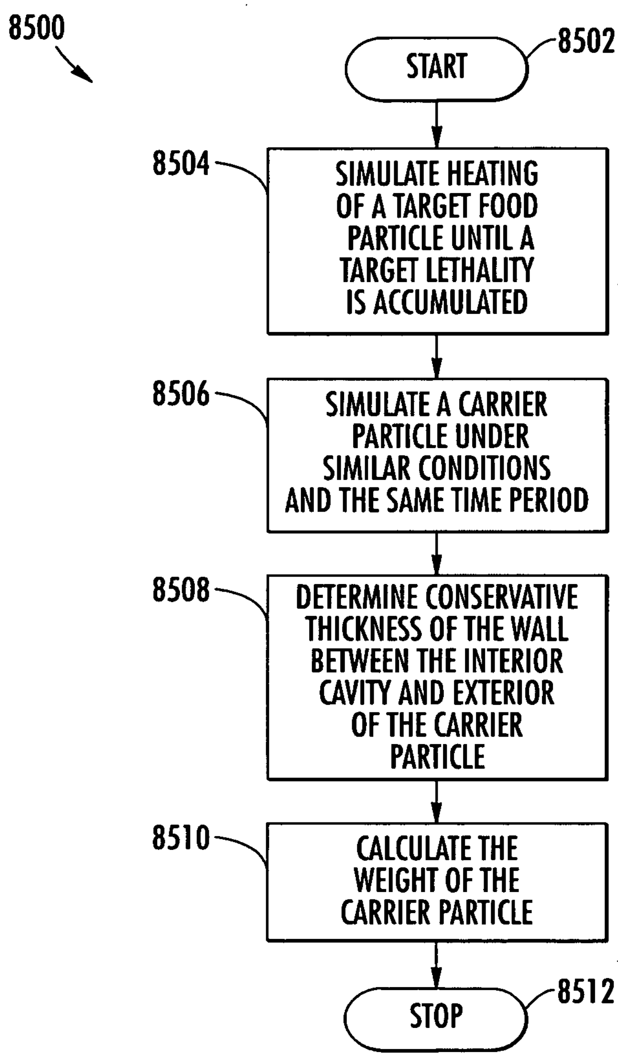

8500
START
8502
8504
SIMULATE HEATING OF A TARGET FOOD PARTICLE UNTIL A TARGET LETHALITY IS ACCUMULATED
8506
SIMULATE A CARRIER PARTICLE UNDER SIMILAR CONDITIONS AND THE SAME TIME PERIOD
8508
DETERMINE CONSERVATIVE THICKNESS OF THE WALL BETWEEN THE INTERIOR CAVITY AND EXTERIOR OF THE CARRIER PARTICLE
8510
CALCULATE THE WEIGHT OF THE CARRIER PARTICLE
STOP
8512

FIG. 85

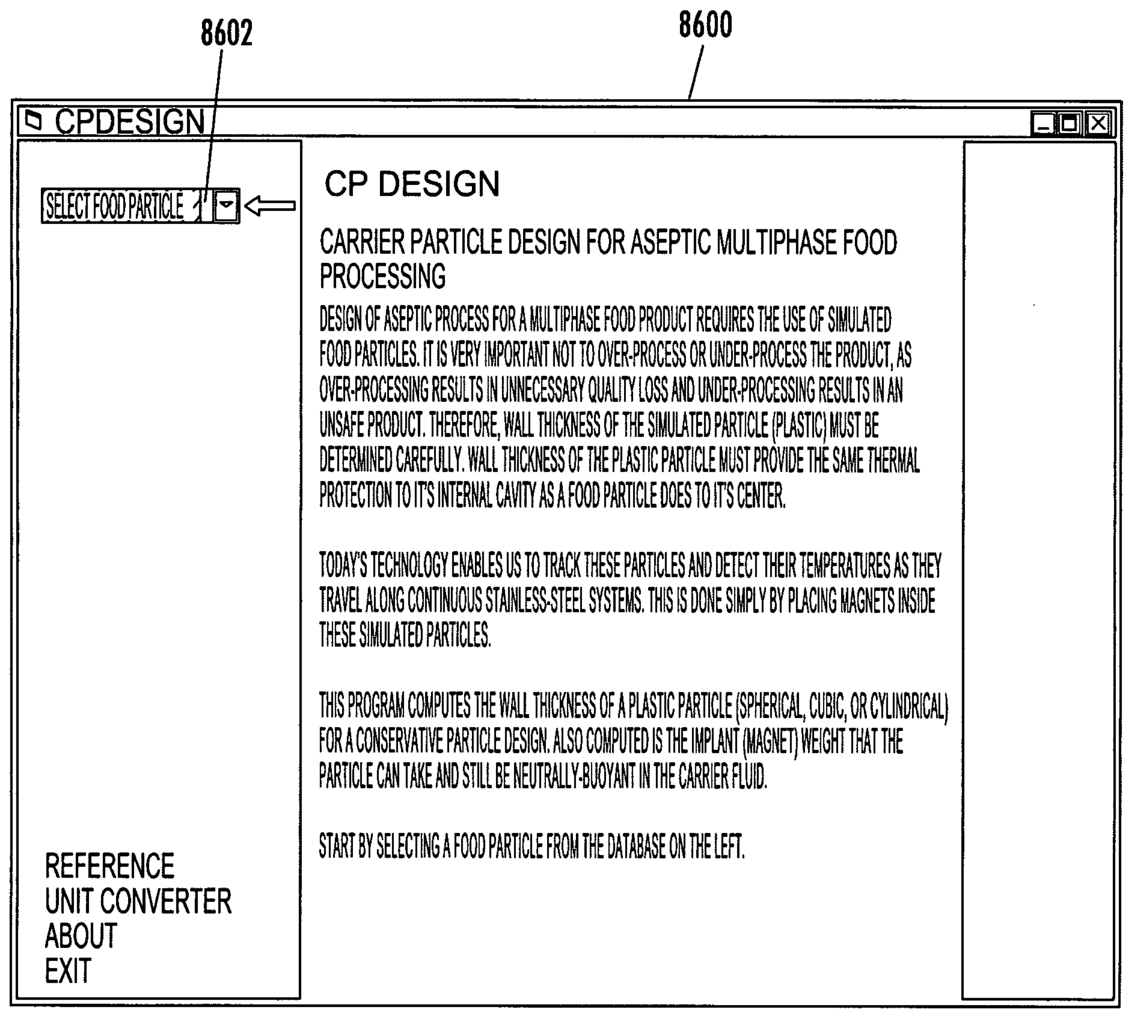

8602
8600
CPDESIGN
SELECT FOOD PARTICLE
CP DESIGN
CARRIER PARTICLE DESIGN FOR ASEPTIC MULTIPHASE FOOD PROCESSING
DESIGN OF ASEPTIC PROCESS FOR A MULTIPHASE FOOD PRODUCT REQUIRES THE USE OF SIMULATED FOOD PARTICLES. IT IS VERY IMPORTANT NOT TO OVER-PROCESS OR UNDER-PROCESS THE PRODUCT, AS OVER-PROCESSING RESULTS IN UNNECESSARY QUALITY LOSS AND UNDER-PROCESSING RESULTS IN AN UNSAFE PRODUCT. THEREFORE, WALL THICKNESS OF THE SIMULATED PARTICLE (PLASTIC) MUST BE DETERMINED CAREFULLY. WALL THICKNESS OF THE PLASTIC PARTICLE MUST PROVIDE THE SAME THERMAL PROTECTION TO IT'S INTERNAL CAVITY AS A FOOD PARTICLE DOES TO IT'S CENTER.
TODAY'S TECHNOLOGY ENABLES US TO TRACK THESE PARTICLES AND DETECT THEIR TEMPERATURES AS THEY TRAVEL ALONG CONTINUOUS STAINLESS-STEEL SYSTEMS. THIS IS DONE SIMPLY BY PLACING MAGNETS INSIDE THESE SIMULATED PARTICLES.
THIS PROGRAM COMPUTES THE WALL THICKNESS OF A PLASTIC PARTICLE (SPHERICAL, CUBIC, OR CYLINDRICAL) FOR A CONSERVATIVE PARTICLE DESIGN. ALSO COMPUTED IS THE IMPLANT (MAGNET) WEIGHT THAT THE PARTICLE CAN TAKE AND STILL BE NEUTRALLY-BUOYANT IN THE CARRIER FLUID.
START BY SELECTING A FOOD PARTICLE FROM THE DATABASE ON THE LEFT.
REFERENCE
UNIT CONVERTER
ABOUT
EXIT

FIG. 86

8700

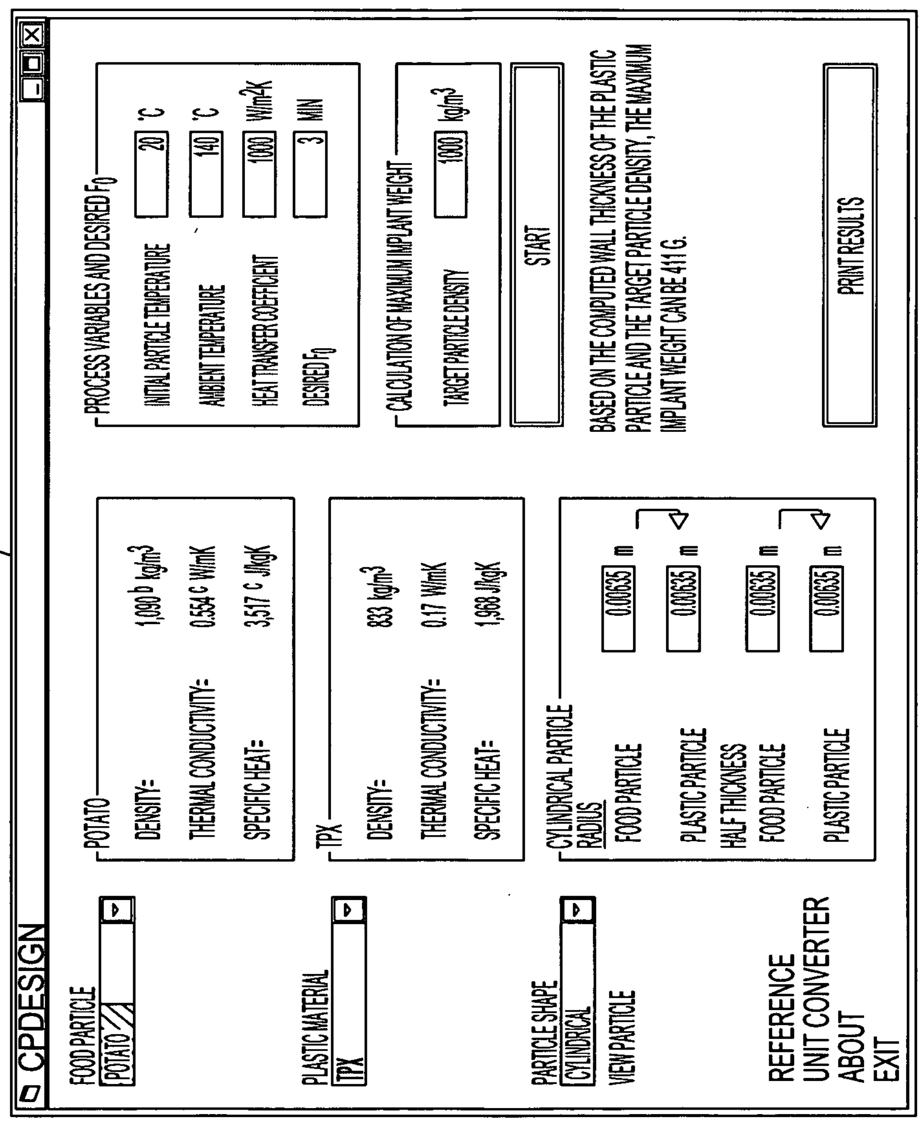

CPDESIGN
FOOD PARTICLE
POTATO
PLASTIC MATERIAL
TPX
PARTICLE SHAPE
CYLINDRICAL
VIEW PARTICLE
REFERENCE
UNIT CONVERTER
ABOUT
EXIT
POTATO
DENSITY= 1,090 b kg/m3
THERMAL CONDUCTIVITY= 0.554 c W/mK
SPECIFIC HEAT= 3,517 c J/kgK
TPX
DENSITY= 833 kg/m3
THERMAL CONDUCTIVITY= 0.17 W/mK
SPECIFIC HEAT= 1,968 J/kgK
CYLINDRICAL PARTICLE
RADIUS
FOOD PARTICLE 0.00635 m
PLASTIC PARTICLE 0.00635 m
HALF THICKNESS
FOOD PARTICLE 0.00635 m
PLASTIC PARTICLE 0.00635 m
PROCESS VARIABLES AND DESIRED F0
INITIAL PARTICLE TEMPERATURE 20 °C
AMBIENT TEMPERATURE 140 °C
HEAT TRANSFER COEFFICIENT 1000 W/m2K
DESIRED F0 3 MIN
CALCULATION OF MAXIMUM IMPLANT WEIGHT
TARGET PARTICLE DENSITY 1000 kg/m3
START
BASED ON THE COMPUTED WALL THICKNESS OF THE PLASTIC PARTICLE AND THE TARGET PARTICLE DENSITY, THE MAXIMUM IMPLANT WEIGHT CAN BE 411 G.
PRINT RESULTS

FIG. 87

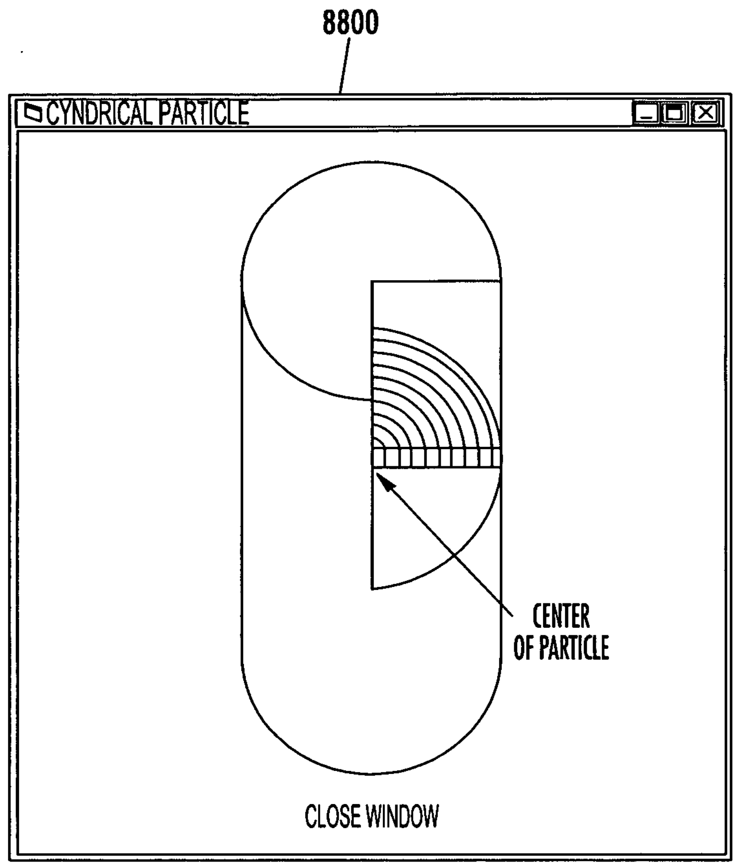


FIG. 88A

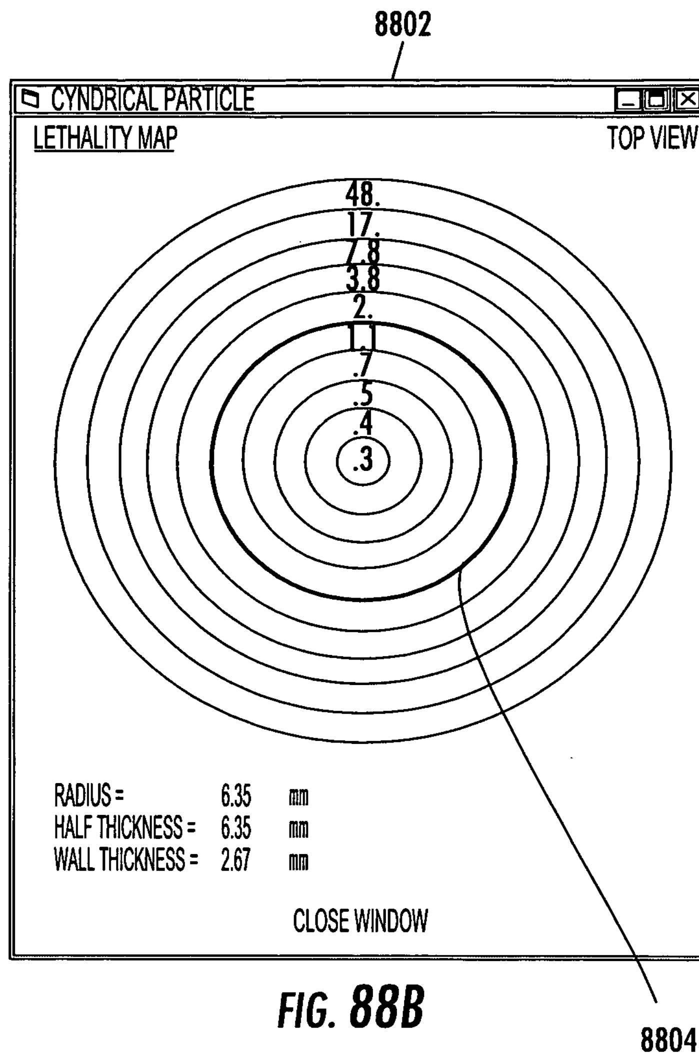

8802
CYNDRICAL PARTICLE
LETHALITY MAP
TOP VIEW
48.
17.
7.8
3.8
2.
1.1
.7
.5
.4
.3
RADIUS = 6.35 mm
HALF THICKNESS = 6.35 mm
WALL THICKNESS = 2.67 mm
CLOSE WINDOW
8804

FIG. 88B

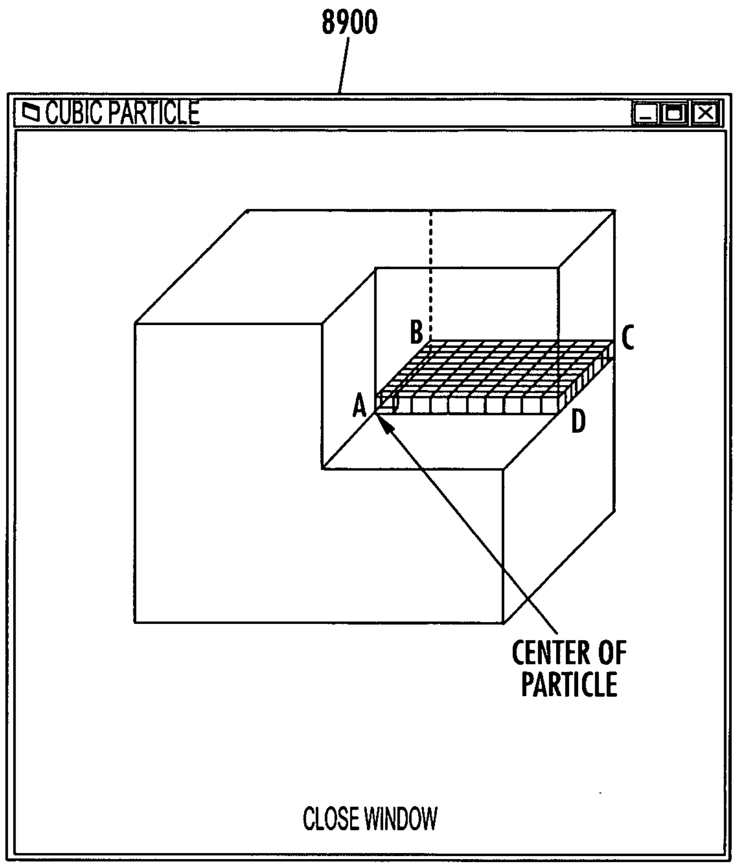
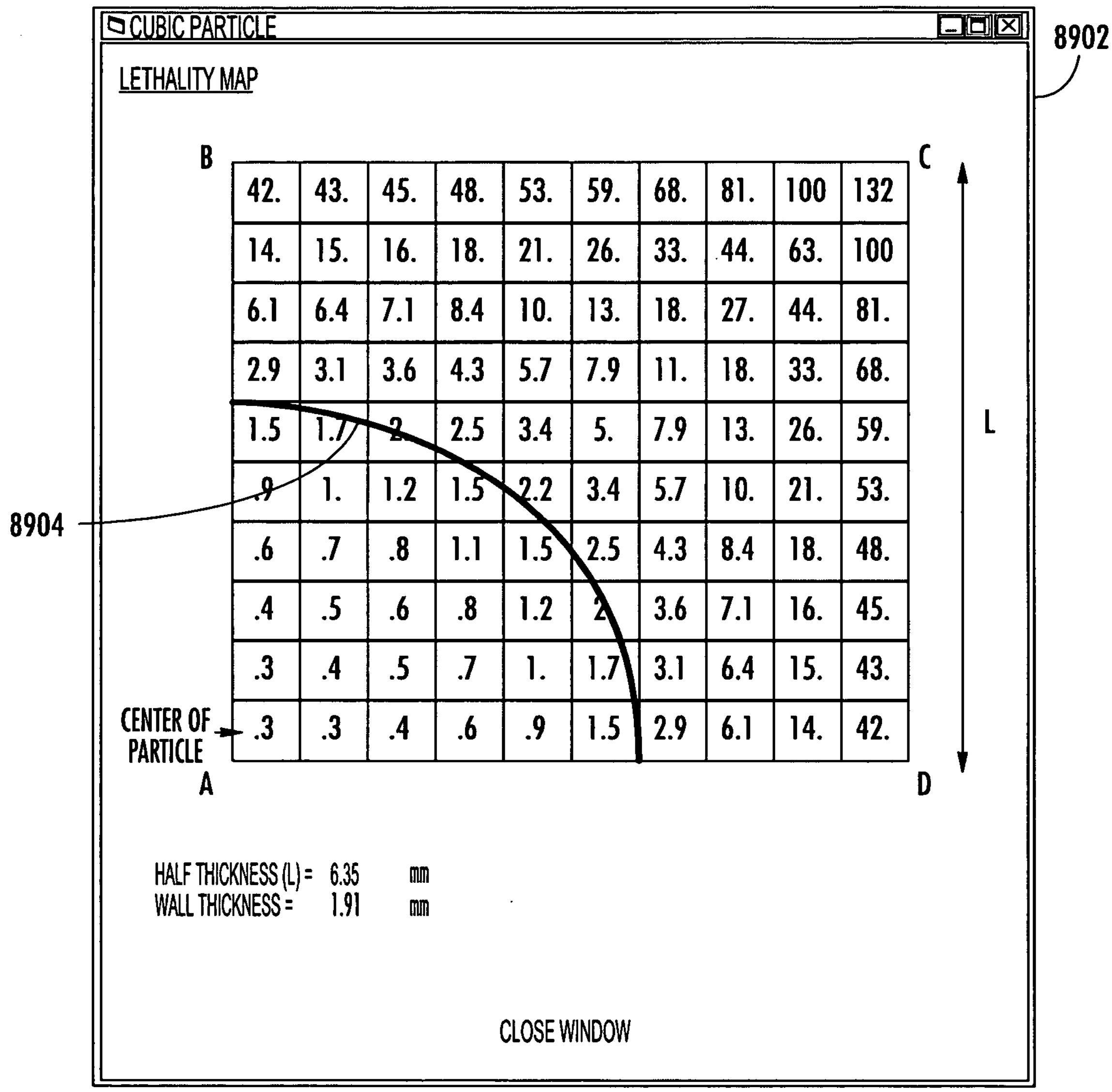


FIG. 89A

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2



42.	43.	45.	48.	53.	59.	68.	81.	100	132
14.	15.	16.	18.	21.	26.	33.	44.	63.	100
6.1	6.4	7.1	8.4	10.	13.	18.	27.	44.	81.
2.9	3.1	3.6	4.3	5.7	7.9	11.	18.	33.	68.
1.5	1.7	2.	2.5	3.4	5.	7.9	13.	26.	59.
.9	1.	1.2	1.5	2.2	3.4	5.7	10.	21.	53.
.6	.7	.8	1.1	1.5	2.5	4.3	8.4	18.	48.
.4	.5	.6	.8	1.2	2	3.6	7.1	16.	45.
.3	.4	.5	.7	1.	1.7	3.1	6.4	15.	43.
.3	.3	.4	.6	.9	1.5	2.9	6.1	14.	42.

FIG. 89B

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

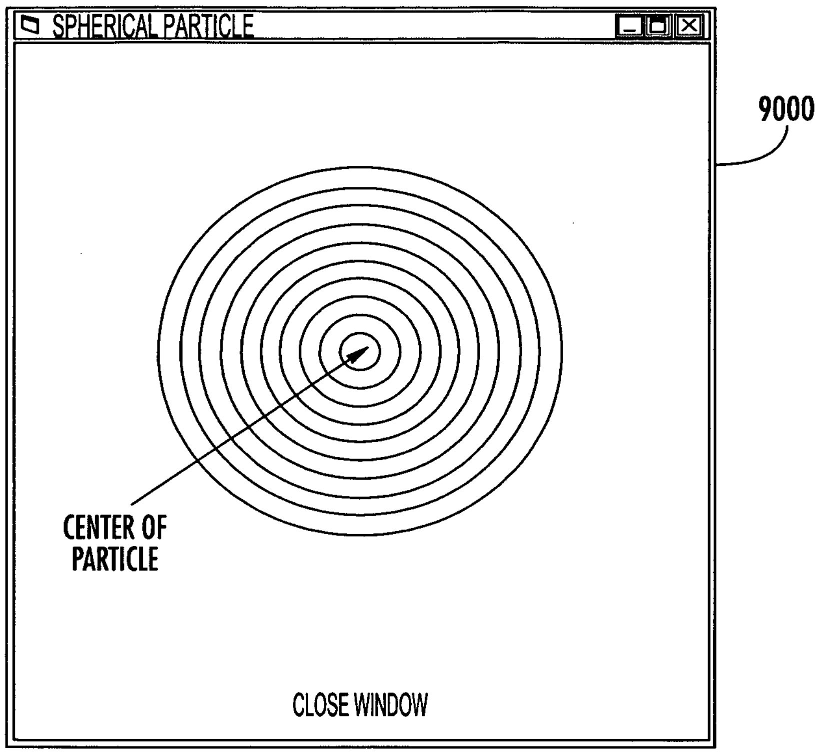


FIG. 90A

REPLACEMENT DRAWING
Title: Methods, Systems, and Devices for Evaluation of Thermal Treatment
Inventors: Palazoglu et al.
Attorney Docket No. 297/164/2

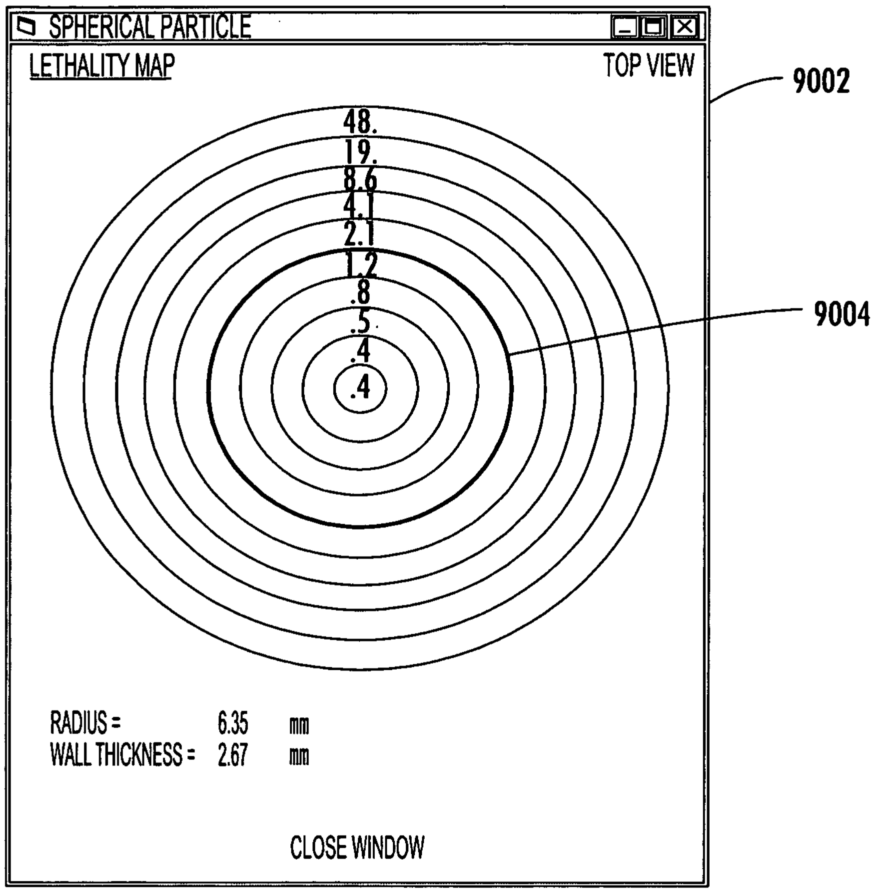


FIG. 90B